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ABSTRACT

This publication identifies exemplary programs and human resources in the automated manufacturing technologies. Its purpose is to assist vocational education program planners and curriculum specialists in updating programs and staff skills to prepare for high technology. Chapter 1 is an introduction. Chapter 2 describes the seven U.S. Secretary of Education's exemplary programs in narrative form. Program name, institution, and the institution's location are highlighted at the beginning of each entry. The program description follows. Contact information, including mailing address and telephone number, is highlighted at the end. Chapter 3 presents in a graphic format exemplary programs identified in a nationwide survey. Programs represent 18 technical areas: avionics, biomedical equipment technology, computer-aided design and drafting, computer-aided manufacturing, computer engineering technology, computer numerical control, electrical technology, electronics technology, electromechanical technology, graphics technology, industrial optics, laser technology, mechanical engineering technology, process control and instrumentation technology, robotics, semiconductor technology, solar technology, and telecommunications. A heading at the top of each page identifies the area. Information presented in box-form includes program title; contact information, including mailing address and telephone number; whether assistance is available; whether a syllabus is available; whether the program is competency-based; start date; and a narrative program description. (YLB)

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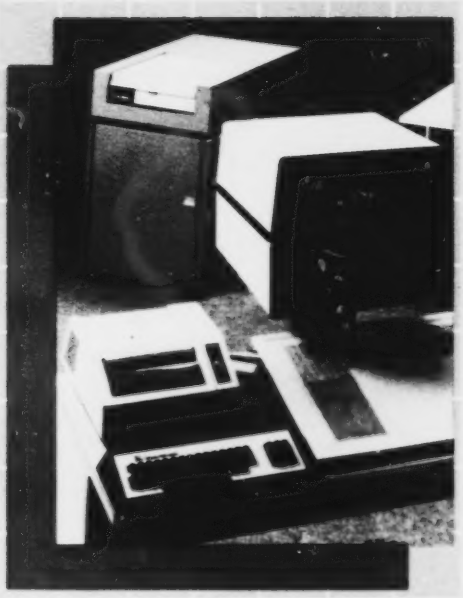
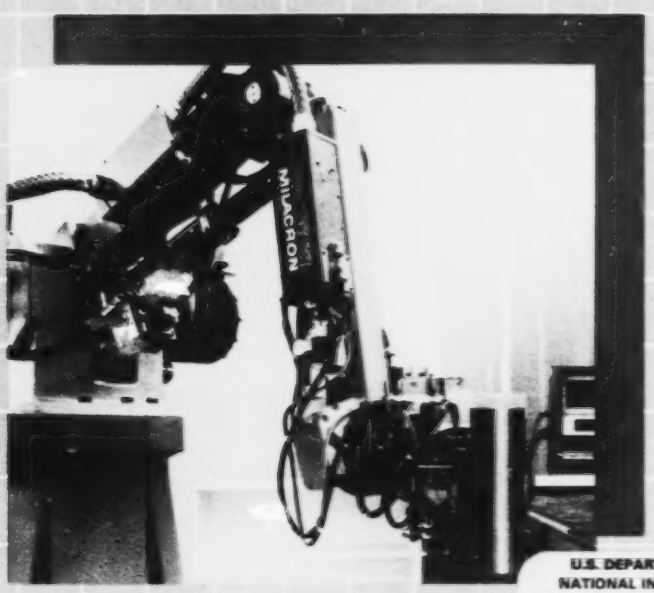
PREPARING FOR HIGH TECHNOLOGY

MODEL PROGRAMS IN THE USA





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PREPARING FOR HIGH TECHNOLOGY: MODEL PROGRAMS IN THE USA

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FOREWORD

Preparing for High Technology: Model Programs in the USA provides information for vocational educators to use in developing or updating programs related to automated manufacturing techologies. Its primary purpose is to assist program planners and curriculum specialists in their effort to update programs and staff skills to prepare for high technology by making available information about exemplary programs currently in existence in these areas; program planners and curriculum specialists can then build on the experience and expertise of others in preparing for high technology

The profession is indebted to Dr. Charles R. Doty for his scholarship in preparing this guide. Dr. Doty is Associate Professor in the Department of Vocational and Technical Education at Rutgers—The State University of New Jersey. Dr. Doty was assisted in preparing the guide by Carolyn DeCastro, Associate Director, Community Service Programs, and Xavier F. Gonzalez, Chair, Electronics Engineering Technology, County College of Morris, Randolph, New Jersey; and Jack Waintraub, Chair, Department of Electrical Engineering Technology, Middlesex County College, Edison, New Jersey. Martha Pocsi, Director, and Dr. Myron Corman, Curriculum Specialist, of the Northeast Network for Curriculum Coordination assisted by providing electronic database searches.

Dr. Marilyn Schlack, President, Kalamazoo Valley Community College, Kalamazoo, Michigan; Dr. Russell Jerd, Dean, Engineering Technology, Sinclair Community College, Dayton, Ohio; and Jeannette Fraser, Program Associate, National Center for Research in Vocational Education contributed to the development of the publication through their critical reviews of the initial manuscript.

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Robert E. Taylor
Executive Director
The National Center for Research
in Vocational Education

CHAPTER 1. INTRODUCTION

A Second Industrial Revolution

Automation has been a familiar part of American manufacturing processes for over a century. Indeed, since the Industrial Revolution of the 19th century, we have come to measure the modernity of an industry by the extent to which work in it is mechanized. The most familiar phenomenon of mechanization has been the assembly line—a conveyance system along which strategically situated workers perform routine, repetitive tasks on items passing by.

Today, a second industrial revolution is occurring as a new wave of automation affects manufacturing processes. This new wave of automation—the high technology of the 1980s—is affecting many more industries than did its predecessor a century ago. To be sure, high technology is making itself felt in manufacturing processes; more and more, robots are taking over the routine, repetitive assembly-line tasks traditionally performed by workers in manufacturing. Robotics, however, is only one part of the high-technology revolution affecting the American workplace.

Perhaps the best known piece of high technology in the workplace today is the computer, which is revolutionizing work processes in many nonmanufacturing occupations. Computers monitor sophisticated biomedial equipment in hospitals and health care facilities; the "drawing board" is obsolescent with the advent of computer-aided design and drafting; computer numerical control systems perform many precision manufacturing operations.

Finally, the impact of high technology is not limited to robotics and computers. A list of high-technology occupations in the 1980s would include avionics, electronics, laser technology, solar technology, telecommunications, process control and instrumentation, graphics, and many others. The high-technology industrial revolution is changing existing occupations and creating new ones at a faster rate than ever before.

What Is High Technology?

High technology can be defined in different ways for different purposes. The Bureau of Labor Statistics, for example, suggests that a high-technology organization is one that spends 10 percent or more of its revenues on research and development and that has a high proportion of scientists, engineers, and technicians among its employees ("High Technology Terms Defined" 1983). Along this vein, Ives's hypothetical construct of technical-scientific employment (1975, p. 24) depicts the overlapping operations and responsibilities of scientists and technicians in such organizations.

Levin (1984), on the other hand, equates high technology with the current revolution in the development and use of computers, lasers, communications, information, production technology, biochemistry, and microbiology. And just as the emergence of work specialization and automation is considered a characteristic of the 19th-century Industrial Revolution (Carnevale 1984), so does the high-technology revolution have a large component of automation today. Lemons (1984, pp. 7-8) refers collectively to seven programmable automation technologies as "high technology": robot-

ics, computer-aided design, computer-aided manufacturing, computer-aided process planning, automated materials handling, and automated storage and retrieval systems.

Such niceties of definition aside, this publication focuses on the high technology of automated manufacturing processes. Change is occurring at a particularly rapid pace in today's automated manufacturing technologies as new machinery, equipment, and processes are put into place, creating new job positions and eliminating old ones overnight. The rapidity with which change is occurring in these technologies offers particular challenges to vocational educators.

Implications for Vocational Education

Vocational educators have been quick to recognize the scope and impact of technological change in the American workplace (Abram et al. 1982); they have been especially concerned with the impact on training programs that prepare workers for the world of work today. Because rapidly changing technology can quickly outdate technicians' skills, for example, Roney (1983) suggests that the content of high-technology programs should include both principles that are universal, unchanging, and transferable and a specialized technology application.

Furthermore, fast-paced technological change can outdate *teachers'* technical knowledge and skills as well. Alfred and Nash (1984) note the emerging need to retrain or revitalize the faculty in public community college career programs. Nelson (1979) remarks that "faculty development will be more important than ever in the 1980s" (p. 143). Kotula (1976), in fact, points out that 3 percent of an institution's total budget should be spent on staff development and curriculum development.

Various research efforts have been undertaken by the National Center for Research in Vocational Education to identify the "state of the art" today in faculty development and upgrading. Long and Warmbrod (1982) identify various sources of funding for programmatic reponses to technological change: State education agencies, foundations, business and industry, and institutional budgets. Wonacott and Hamilton (1983) found six basic delivery techniques in use to update teachers' technological knowledge and skills (work experience internships; university and college course work; workshops, conferences, and seminars; industry observation; education and industry staff exchange; and part-time employment). Warmbrod, Persavich, and L'Angelle (1981) describe four model "return-to-industry" programs operated by community colleges.

Likewise, Hamilton and Wonacott (1984) undertook research into the essential characteristics of successful programs to update teachers' technological knowledge and skills. They identified nine such characteristics that, taken together, constitute a generic strategy for vocational educators to follow in planning and implementing update programs for secondary and postsecondary teachers and instructors.

The Need for Curriculum Resources

In spite of the considerable body of knowledge on effective methodologies for updating teachers' and instructors' technological knowledge and skills, there exists another large area of need among vocational educators. Once teachers and instructors have participated in knowledge and skill update activities, they must still update their program curricula; it is vital that students receive training that reflects the state of the art in their occupational technologies.

One excellent approach to updating curricula for automated manufacturing technologies programs is to build on the experience and expertise of others in implementing such programs. This publication was compiled to identify exemplary programs and human resources in the automated manufacturing technologies. Chapters 2 and 3 consist entirely of entries for the exemplary programs; each entry includes contact information and a narrative description of the program. Two different means were used to identify the exemplary programs described in this publication.

Secretary of Education's Exemplary Programs

In 1981, the U.S. Secretary of Education initiated an awards program in which 1 vocational education program in each of the U.S. Department of Education's 10 regions is designated as exemplary each year. These awards are made only to programs that demonstrate a broad-based enrollment, are in compliance with civil right statutes, and have been operational at least 1 year. Ten additional criteria are used in the selection process; such program characteristics as stated objectives, demonstrated progress toward stated objectives, instructional equipment and facilities that complement stated objectives, community involvement, a high job-placement rate, and prior program recognition or publicity are scrutinized in the selection process.

Since the first awards in 1981, a number of automated manufacturing technologies programs have been designated as exemplary by the Secretary of Education. Descriptions of these programs, which have been disseminated by the Office of Vocational and Adult Education of the U.S. Department of Education, are presented in chapter 2.

Nationwide Survey of Exemplary Programs

Additional exemplary programs in automated manufacturing technologies were identified through a survey of the States and Territories. State-level administrators of higher education nominated exemplary automated manufacturing technologies programs operated by community colleges and technical institutes in their States or Territories. Staffs of nominated programs were asked to provide program descriptions; programs for which this information was obtained are included in chapter 3 and represent the following technical areas:

- Avionics
- Biomedical equipment technology
- Computer-aided design and drafting
- Computer-aided manufacturing
- Computer engineering technology
- Computer numerical control
- Electrical technology
- Electronics technology
- Electromechanical technology
- Graphics technology
- Industrial optics
- Laser technology
- Mechanical engineering technology
- Process control and instrumentation technology
- Robotics
- Semiconductor technology
- Solar technology
- Telecommunications

How to Use this Publication

Each of the two kinds of exemplary programs presented in this publication is described in a standard format. The U.S. Secretary of Education's Exemplary Programs appear in chapter 2 in basically narrative form. The name of the program, the institution at which it is located, and the institution's location are highlighted at the beginning of each entry; contact information, including mailing address and telephone number, is similarly highlighted at the end of each entry.

The programs identified in the nationwide survey are presented in a consistent graphic format in chapter 3. As shown in figure 1, a heading at the top of each page identifies the technological area that the program represents. The program title appears in the box at the top of the entry; contact information, including mailing address and telephone number, appears in the box immediately below. Four small boxes appear below the contact information; these indicate whether assistance is available, whether a syllabus is available, whether the program is competency based, and when the program was started. Finally, each entry presents a narrative description of the program in the large box at the bottom of the page.

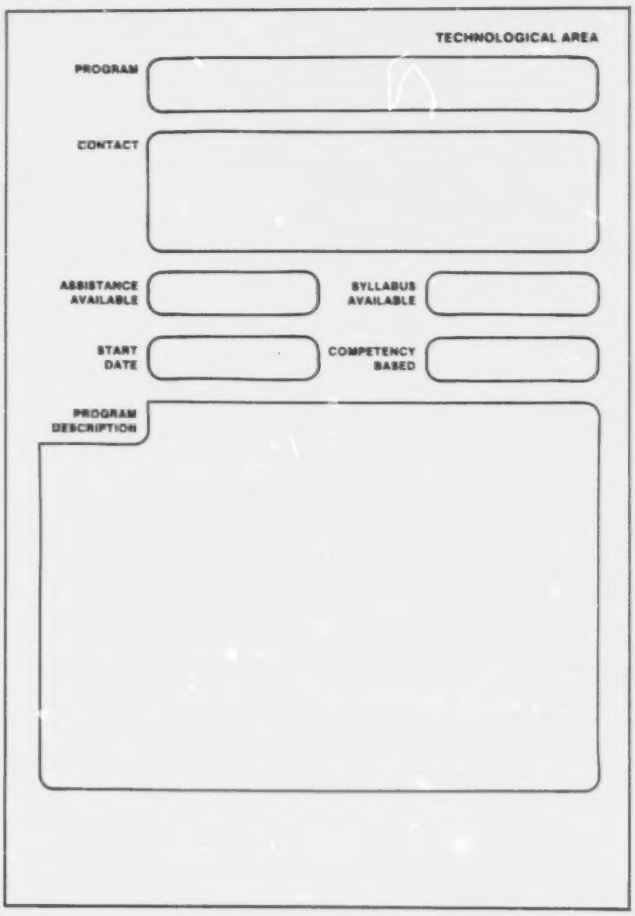

Figure 1. Nationwide exemplary program description format

CHAPTER 2. SECRETARY'S EXEMPLARY PROGRAMS

Industrial Electricity and Electronics Program
St. Johnsbury Academy
St. Johnsbury, Vermont

In the school year prior to its selection, the Industrial Electricity and Electronics Program served 44 students—3 female and 41 male. An open-entry/open-exit referral concept allows both vocational and college-bound students to take optimal advantage of the program. Students are referred by and transported from their sending schools for half-day vocational instruction that is delivered through the use of individualized behavioral objectives. Sixty-one percent of completers go on to higher education institutions, 23 percent accept employment in program-related work, and 10 percent go into military service. Of those completers immediately available for employment, 75 percent are placed in jobs by program staff.

The program has been adopted, with adaptations, in other area vocational centers in the State. The open-entry/open-exit concept enables the instructor to serve many more students than would be possible in a traditional program. Students are allowed to work at their own rate and receive credit only for competencies demonstrated above their clearly defined individual minimum standards. Reference materials and equipment are available to students when they need to use them. Students learn how to learn and to challenge themselves on their own while they are acquiring marketable skills.

The reputation of the graduates of the program with employers is excellent. Employers consistently give very high ratings to the program and its completers whom they employ.

For further information contact:

Lou Gehlbach
Director
St. Johnsbury Academy
Main Street
St. Johnsbury, VT 05817
(802) 748-8171

Drafting and Design Technology Program
Okaloosa-Walton Junior College
Niceville, Florida

The Drafting and Design Technology Program for freshmen and sophomores served 113 students—30 female and 83 male—during the year of its selection. It prepares students for careers in drafting and computer-aided design and drafting. In addition to providing job preparatory training, the program offers updating training for employed technicians in the field and job retraining

for adults whose job skills have become obsolete due to advances in technology. It offers both the associate of science degree and technical certificates.

During the past 8 years, the Drafting and Design Technology Program has been emulated by other institutions in 38 States and 2 foreign countries. Some of the areas of the program that have generated particular interest are placement and follow-up, computer-aided design and drafting training, and students with special needs (i.e., displaced homemakers, minorities, handicapped, and disadvantaged).

The program maintains a 92 percent successful placement record, and its placement and follow-up model is being used throughout the State of Florida. Graduates of the program hold more than 100 of the approximately 138 drafting positions in Okaloosa County, and other graduates have been placed in more than 50 cities throughout the country.

The program maintains a cooperative agreement with local industry so that all students who have not had previous working experience can complete a one-semester internship on the job before graduation.

The major objectives of the program are as follows:

- Prepare adults for responsible, rewarding careers as drafting and computer-aided drafting technicians
- Deliver high-quality technical updating training for employed drafters, designers, engineers, architects, and drafting teachers
- Retrain adults whose job skills have become obsolete due to advances in technology or who wish to make a midcareer change
- Serve as a "model" vocational-technical program that can be emulated by other programs through the United States

For further information contact:

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Information Services Officer
Okaloosa-Walton Junior College
100 College Boulevard
Niceville, FL 32578
(904) 678-5111, ext. 383

Computer-aided Design/Computer-aided Manufacturing (CAD/CAM) Program
Elgin Community College
Elgin, Illinois

The Computer-aided Design/Computer-aided Manufacturing (CAD/CAM) Program is a partnership between industry and education. Annually, it serves approximately 400-500 students, about two-thirds of whom are men and one-third women.

The program began in 1979 when a private sector firm offered its facilities and equipment to 15 drafting and design students from Elgin Community College. The Saturday morning classes were taught by the director of a major division of the firm, and each course was oversubscribed by at least 15 students. At that time, many large firms were having trouble finding well-trained personnel to operate their systems, and they recognized that only through the training of competent technologists could that need be met. Consequently, a major equipment manufacturer donated a complete CAD system.

In March 1981, the college's industrial technology staff prepared a proposal to involve industry, and in-depth interviews were conducted with area industrial leaders and professional organizations, as well as with the college's industrial leaders and technology staff and advisory councils. In order to demonstrate their support, area manufacturers and the Society of Manufacturing Engineers (SME) donated funds toward the purchase of a CAM system. The college's CAD/CAM advisory committee, representing management of 15 area industries, unanimously agreed that the CAM system would meet their organizations' needs. Furthermore, the more than 125 companies that had sent representatives to the college's CAD seminars, workshops, and demonstrations agreed to send their employees for CAD training at the college. As a result, Elgin Community College now offers an associate degree in both CAD and CAM. Also, it offers short seminars and workshops in CAD/CAM operations. Those involved in making this training possible include 30 employed engineers, designers, drafters, and technicians, and full-time college engineering and technology students.

For further information contact:

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Industrial Technology and Mathematics
Elgin Community College
1700 Spartan Drive
Elgin, IL 60120
(312) 888-7359

Graphic Arts Technology Program
Central Maine Vocational Technical Institute
Auburn, Maine

There are approximately 300 industries in Maine that employ graphic arts technology personnel. Many of these are small establishments that employ 30 or fewer people, or larger ones that seldom employ more than 100.

Central Maine Vocational Technical Institute's Graphic Arts Program is the only postsecondary offering in the State, and job opportunities requiring formal training far exceed the annual number of graduates. For example, during the 1981-82 school year, 106 job openings, about 75 percent of which required formal training, were posted on the institute's active job list. Twenty of these positions were filled by the institute's graduates and four by institute students with some training.

During the year of the program's selection, 51 students were enrolled in the program—22 males and 29 females. There were 22 graduates. The program is a comprehensive 2-year sequence of training activities that prepares students for employment in all phases of the printing industry in such positions as press operator, copy layout technician, and phototypesetter. Training includes

theory, application, and an internship of 1,500 hours of paid employment, the latter offered during the second year of training. Students have the option of earning a certificate, a diploma, or an associate degree.

Throughout the 2 years, students are encouraged to perform by industry standards. This means that attention is focused on three priorities: quality of work, care of equipment, and production.

The 14-member occupational advisory committee offers much guidance to the program. Permanent members of the committee are the chairperson of the Graphic Arts Technology Department and three faculty members. They work closely with the State graphic arts trade association and choose 9 representatives from industry for 3-year terms.

Present representatives from industry include wide diversification both in employment and in geographic location. Included are skilled graphic arts workers in small- or medium-sized industries, sales representatives or general managers of larger industries, and the owners of small establishments.

The student representative, who must be in the second year of training, is elected each year by the students. Thus, the trainees, the trainers, and the potential future employers are all represented on the advisory committee.

Regardless of the graphic arts specialty and regardless of the preference for employment in a small or large industry or in a business of one's own, graduates of the institute's graphic arts program have found their way into economic productivity. A few examples are as follows:

- A graduate took a job at a small industry that employed about 20 employees. His job was in stripping image assembly work—the organizing of film material for press plate. He is now a key employee of that establishment.
- A graduate now owns and operates a small industry with the help of 2 other members of her family.
- A graduate now owns his own firm and employs about 10 other persons.
- A graduate who specialized in copy preparation is now a phototypesetting supervisor of about 12 employees. She is one of that industry's 100 or more employees.
- A graduate now owns his own business and employs about 20 people.

For further information contact:

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Graphic Arts Technology Department
Central Maine Vocational Technical Institute
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Auburn, ME 04210
(207) 784-2385

Training Opportunities Program (TOP)
New York City Board of Education
Brooklyn, New York

The New York City Public Schools have expanded and strengthened linkages with the private sector through its Training Opportunities Program (TOP). More than 250 small- and medium-sized businesses participate in the program and pay 50 percent of the student training costs.

The primary focus is for 21 high schools in all 5 boroughs of New York City to work with a variety of businesses; to utilize facilities, equipment, and human resources not readily available at the local high school; and to provide expanding opportunities for women and minorities.

Students are selected on a wide range of criteria such as interest, experience, occupational goals, handicapping conditions, limited-English-speaking ability, and interest in nontraditional careers. TOP exposes students to the real world of work and reinforces the natural partnership between school and work.

A survey of the outcomes of the program included such data as the following:

- Eighty-two to 98 percent of the employers rated trainees' performance on the job as adequate or more than adequate.
- Sixty-two percent of the employers indicated that the trainee performed better than expected.
- Ninety-one percent said they would be willing to accept another trainee next year.
- More than 86 percent of the trainees stated that they benefitted from participating in the program.
- More than three-fourths of the establishments indicated that they would employ TOP trainees after the training period ended and cited the trainees' good performance as the reason.
- Two-thirds of the trainees had the opportunity to work on equipment not available at school, particularly high-technology equipment.
- Major benefits to trainees were increased knowledge and experience and the learning of good work habits and skills in career decision making.

The target group of the program is in-school youth in grades 11 and 12, from 16 to 21 years of age.

The 1982 program addressed two main priorities: youth employment and economic development. A total of 874 students (332 females and 542 males) participated in the program. Of that number, 43 percent were black and 35 percent were Hispanic. Handicapped students represented 6 percent of the total. Of those enrolled in the program, more than half were from homes in which the annual income was less than $10,000; 90 percent of the students came from homes in which the annual income was under $20,000. Thus, being prepared for a job and becoming employed were necessities for many of the 243 graduating seniors in the 1982 program; 48 percent became gainfully employed, and 45 percent enrolled in institutions of higher learning. The program began in 1981, and by March 1983 a total of 1,136 students had actually received training. Some students

train in an alternate-week mode—1 week of work and 1 week of school—but most students receive training on a part-time basis after school or full-time weekend basis. Students may receive training in such occupations as these:

- Data processing
- Optical technology
- Climate control
- Drafting
- Printing
- Auto diagnostics
- Security systems
- Small animal care
- Health
- Graphic arts
- Electronic technology repair

For further information contact:

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Laser Technician Program
North Central Technical Institute
Wausau, Wisconsin

When North Central Technical Institute's Laser Technician Program was initially proposed, only three programs of its kind were operating in the Nation. Its 2-year postsecondary program, approved by the State board in the fall of 1977, began operating in 1978. At that time there were only four other programs in the United States. It is still the only public training program for laser technicians in Wisconsin.

Of the graduates working in related employment, 48 percent work in the North Central Technical Institute District, 34 percent elsewhere in Wisconsin, and 18 percent out of State. There were about 75 enrolled in the 1982 full-time program and 20 in the elective courses in the evening program. There were 34 graduates.

The objectives of this program are as follows:

- To provide a formal education program in laser technology leading to an associate degree
- To provide students with the knowledge, skills, and experience necessary to obtain employment as a laser systems technician
- To provide a prepared work force needed to meet the rapidly increasing demand for trained technicians in the field of laser technology

- To provide a program for presently employed technicians to upgrade their skills for advancement on the job by offering a continuing education program

An introduction to lasers is covered in the first semester's key course. It provides the theory of all lasers, compares the design and properties of each, and teaches how to measure the characteristics of the laser output and how to clean and align laser mirrors. The key course in the second semester covers laser optics, which includes both geometric and wave optics theory and the application of the theory to optical components used in lasers.

Lasers and electro-optics equipment are addressed in the third semester's key course. Students work with medium- and high-power lasers, applying the theory learned in the first two semesters to a variety of lasers and measuring instruments. The fourth semester key course addresses laser application projects in which there are 6 hours of lab time for every hour of lecture.

The curriculum includes much hands-on experience working with a variety of types of lasers located in a specially designed facility that incorporates seven different lab areas as well as a lecture room.

As the result of several noncredit public information courses, local industries have become involved with laser applications. Student projects are often coordinated with the research needs of outside agencies such as local industry, business, and medical groups. Recently, a carbon dioxide laser head and power supply, worth about $35,000, were donated to the institute. The gift was arranged by a Laser Technician Program graduate who is now employed by the donating industry.

For further information contact:

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Irrigation Technology Program
Walla Walla Community College
Walla Walla, Washington

The Irrigation Technology Program was initiated at Walla Walla Community College in the fall of 1977. Students spend two quarters on campus in training in the classroom, and during spring and summer quarters they are employed in cooperative training jobs. After the cooperative training experience, students return to campus for two more quarters of training in the classroom. After the successful completion of six quarters, students are eligible for graduation with an associate of applied arts and sciences degree in irrigation technology.

During the 1983 winter quarter, 25 full-time students were enrolled in irrigation technology, and 8 students had already paid a deposit to reserve a place in the September 1983 class. In order to ensure that students possess the basic skills required for the program, students are screened in algebra and reading. Those who need additional help with basic skills are then directed to compensatory education classes to make up the deficiencies.

The purpose of the program is to train students to install, service, maintain, and repair sprinkler irrigation systems, particularly center pivot systems. Instruction includes electricity and basic wiring and center pivot troubleshooting, as well as sources and application of irrigation water and soil-water-land relationships. It also includes blueprint reading, business and personnel management, and surveying.

Student progress is assessed regularly both in the classroom activities and in the cooperative training sessions. Students who graduate from the program take with them a resume of actual work experience, and they build employment references while enrolled in the program.

The on-campus classroom and laboratory consist of approximately 1,500 square feet. This area includes student work tables, work benches, and shop space for project work. There is also a two-tower center pivot system installed on campus that was donated by a local manufacturer.

Work during the cooperative training experience is defined in a training agreement that focuses on the learning objectives of each student to ensure against work exploitation. Students keep weekly records of work and learning experiences. A seminar class is held concurrently with the cooperative training time period. This provides an opportunity for students and employers to discuss experiences that students have had in their job training.

The private sector is much involved in the program through representatives serving on the advisory committee, through the hiring of cooperative training students, and through the donating of supplies and equipment. The instructor is in constant contact with local businesses to seek cooperative training positions for students.

During the 2 years prior to the program's selection, 100 percent of the students who completed the program were employed, 85 percent of them in the irrigation industry. When they complete training, most students have a choice of jobs. Employers call the college seeking employees. In addition to being employed locally, students have found employment in other States—Oregon, New Mexico, and Nebraska—and in foreign countries. There is a particular demand for irrigation technicians in Saudi Arabia.

For further information contact:

James R. Peterson
Director
Occupational Education
Walla Walla Community College
500 Tausick Way
Walla Walla, WA 99362
(509) 527-4215

PROGRAM

Avionics Technician

CONTACT

Goesta Schmidt
Instructor
South Seattle Community College
6000 16th Avenue SW
Seattle, WA 98106
(206) 764-5394

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1975

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Avionics (Aviation Electronics) Technician Program is a specialized 2-year (6 quarters) training program offering contemporary technology instructional curriculum both in theory and practice. The avionic technician curriculum prepares students to qualify for the Federal Communication Commission (FCC) general class radiotelephone licensing requirements. Associate of applied science degree requirements are as follows:

Technical Specialty Courses

Number	Course Title	Credits
INT 160	Fundamentals of Electronics	8
INT 161	Amplifiers and Oscillators Communication Systems	8
INT 163	Programming for Electronic Technicians	8
INT 116-19	Introduction to Avionics	4
AVT 264	Intermediate Avionics	9
AVT 266	Advanced Avionic Systems	10
AVT 268		10
		57

Continued

Allied Supporting Classes

Number	Course Title	Credits
MAT 111-13	Technical Math	12
PHY 101-03	General Physics	15
		27

General Education Courses

Number	Course Title	Credits
ENG 101-02	Composition	6
ENG 108	Technical Report Writing	3
	General Education Electives (must include one course in social science)	9
		18

Total Credits	102

PROGRAM

Biomedical Equipment Technology

CONTACT

Paul L. McQuay
Dean of Applied Sciences
Delaware County Community College
Media, PA 19063
(215) 359-5288

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1980

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The Biomedical Equipment Technology Program prepares graduates for employment as electronic technicians in the health care field. The program has a strong electronics base with extensive course work in anatomy, physiology, and the social sciences. The CSEL (college-sponsored experiential learning) experience is an integral part of the program with students placed in hospitals, extended care facilities, and service bureaus for on-site training. The program is articulated with the local secondary vocational system and two local institutions of higher education. An associate of applied science degree is awarded at the completion of the program.

***Technical assistance available:**

- Additional information about the program
- Consultants for proposal preparation, curriculum development, program review, and equipment selection

Biomedical Equipment Technology

PROGRAM

Biomedical Instrumentation Technology

CONTACT

Springfield Technical Community College
One Armory Square
Springfield, MA 01105
(413) 781-7822

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1967

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

Instrumentation is being used increasingly in medical, biological and research fields. This equipment has become so complex that technicians must have a detailed knowledge of biomedical procedures and biomedical terminology so that proper functioning of the equipment and safety of the patient can be assured. The program provides the general technical knowledge and understanding of the more commonly used biomedical instruments, components, systems, and circuit techniques. The degree of associate in science in biomedical instrumentation technology will be awarded after successful completion of the program requirements.

SEMESTER 1

Number	Course Title	Class	Lab	Credits
LE 100	English Composition	3		3
	Elective: Humanities	3		3
EB 120	Measuring Principles	2	3	3
ET 110	Basic Electronics	3		3
ET 115	Electronics Lab		4	2
MM 101	Mathematics	1		1
MM 102	Mathematics	1		1
MM 103	Mathematics	1		1
MM 231	Engineering Computations	1		1
		15	7	18

Continued

SEMESTER 2

Number	Course Title	Class	Lab	Credits
LE 200	Comp 2: Intro. to Lit.	3		3
EB 230	Measuring Principles	2	3	3
ET 210	Basic Electronics	3		3
ET 220	Active Networks	3		3
ET 215	Electronics Lab		4	2
MC 100	Chemistry 1	3	3	4
		14	10	18

SEMESTER 3

Number	Course Title	Class	Lab	Credits
LE 202	Technical Report Writing (or)			
LE 203	Fundamentals of Speech	3		3
EB 320	Calibration & Standardiz.	1	3	2
EB 340	Electronic Circuits	2	3	3
ET 340	Comp. Architecture and Logic Circuitry	3		3
	Humanities Elective	3		3
ET 350	Electronics Lab 3		4	2
		12	10	16

SEMESTER 4

Number	Course Title	Class	Lab	Credits
EB 410	Bio-Med. Elect. System 392	2	3	3
EB 420	Instrumentation Project		6	2
EB 430	Codes-Laws-Safety	1		1
ED 420	Microprocessor Theory	3		3
MB 136	Applied Physiology	3	3	4
		9	12	13

Computer-aided Design and Drafting

PROGRAM

Drafting Computer-aided Design

CONTACT

Don Watts
Program Head for Drafting Technologies
Boise State University
1910 University Drive
Boise, ID 83725
(208) 385-1538

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

In press

START DATE

1984

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

Auto-CAD and Auto-Trol automated drafting systems are utilized in mechanical, architectural, and civil and electronic drafting. Thirty to forty percent of assignments utilize computer-aided design in a four-semester sequence. Associate of applied science and bachelor of applied science degrees are available.

PROGRAM

Drafting and Design Technology
with Computer-aided Design

CONTACT

Paul L. McQuay
Dean of Applied Sciences
Delaware County Community College
Media, PA 19063
(215) 359-5288

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1981

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The Drafting and Design Technology with Computer-aided Design Program prepares students for employment as entry-level drafters and provides the technical background required for advancement as drafters and designers. In 1981-82, the use of computer-aided design was added to the program competencies using the CADDS I system and Computervision equipment. Early in 1984, Delaware County Community College was selected to participate in IBM's program of support for technical curricula and received a donation of the IBM Fastdraft system. This program is articulated with the local secondary vocational school drafting and design program.

***Technical assistance available:**

- Additional information about the program
- Consultants for proposal preparation, curriculum development, program review, and equipment selection

Computer-aided Design and Drafting

PROGRAM

Drafting and Design Technology Program

CONTACT

Carl Burstedt
Program Coordinator
School of Vocational-Technical Education
Idaho State University
Pocatello, ID 83209-0009
(208) 236-3492

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes**

START DATE

1959

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The Drafting and Design Technology Program serves students in the disciplines of machine structural drafting and design and electromechanical drafting. In this 2-year program, design and drafting skills are emphasized by requiring the student to spend 18-20 hours per week at the drawing board. Mathematics through trigonometry is also taught along with courses in communications, statistics, and strength of materials. Instruction will be given on the computer-aided design system (HP1000 Holguin software). A portion of the drawings assigned will be done on the computer-aided design system. It should be emphasized that a computer-aided design system is a tool. Strong design and drafting skills continue to be the focus of the program.

***Technical assistance available:**

- Upgrading courses available to the community
- Information about various systems

**A revised program outline will be available soon. Computer-aided design will not be taught as a separate course in this program but as an integral part of design-drafting lab.

PROGRAM

Computer-aided Design

CONTACT

Dallas Garrett
Division Chairman of Engineering and Computer Technology
Lorain County Community College
1005 N. Abbe Road
Elyria, OH 44035
(216) 365-4191, ext. 435

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1983	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

The computer-aided design option of the associate degree was made available in 1983. The associate of applied science degree has been offered since the early 1960s. A Computervision CADDS IV system was selected to implement the program, along with 22 IBM computers.

Over 200 students are enrolled in the Computer-aided Design Program. It is in operation 24 hours per day. Success in placing students in employment is exceptional.

***Technical assistance available:**

- Basic program philosophy statement
- Program brochures
- Curriculum guides
- Course descriptions
- Course outlines
- Instructional materials (manuals)
- Scheduling techniques
- Placement information
- Job Training Partnership Act program writing assistance
- Industrial contacts
- Use of laboratory assistants

PROGRAM

Mechanical Drafting and Design Technology

CONTACT

Alvin C. Eckre
Director of Administrative Services
North Dakota State School of Science
Wahpeton, ND 58075
(701) 671-2249

ASSISTANCE AVAILABLE: Yes*

SYLLABUS AVAILABLE: Yes

START DATE: 1958

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The goals of the Mechanical Drafting and Design Technology Program are as follows:

- Prepare students in the graphic art of communication including detail and layout drafting, tool and die design, structural drafting, product illustration, electrical drafting, and production
- Prepare students in the theory aspects of all related subjects including mathematics, stress emphasis, metallurgy, production, and machine design for job entry-level employment
- Develop students' abilities in human relations, communications, and other aspects of general education

Mechanical drafters assist in designing and perfecting machines, processes, materials, and services in the complex world of work. Mechanical drafting jobs frequently require the ability to apply scientific principles or to solve, design, process, or service problems.

***Technical assistance available:**

- Visits to the college mechanical drafting and design department upon request
- Sample lesson plans
- College catalogs

PROGRAM

Technical Drafting Design

CONTACT

Forrest L. Johns
Department Head of Drafting Technology
Oklahoma State Tech
Fourth and Mission Road
Okmulgee, OK 74447
(918) 756-6211, ext. 250

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	No
START DATE	1948	**COMPETENCY BASED**	No

PROGRAM DESCRIPTION

This program of study is designed to teach drafting technicians to prepare the technical documents that are required for developing design ideas. Technical drafting and design technicians may select careers in one or more areas such as drafting with an emphasis on design in fields such as machine, mapping, architecture, process piping, structural, or the electrical and electronics industry.

An introduction to computer-aided design drafting and computer-aided manufacturing is a part of this program. Topics include such areas as system configuration, operation, and utilization. Skills in the use of computer-aided design and computer-aided manufacturing in selected specialty areas are developed. Two- and three-dimensional graphic representations are included in the students' repertoire of skills.

PROGRAM

Industrial Drafting and Design Technology

CONTACT

Russell L. Kline, Department Head
William Nelson, Assistant Director of Instruction
Oklahoma State University Technical Institute
900 N. Portland
Oklahoma City, OK 73107
(405) 947-4421

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1962	**COMPETENCY BASED**	No

PROGRAM DESCRIPTION

The Industrial Drafting and Design Technology Program is designed to provide students with an understanding of engineering principles utilized in high-tech applications and drafting skills (encompassing computer-aided design experience) and applicable to practical problems in design and graphic illustration. The program leads to an associate of science degree in engineering technology. Students are prepared for employment in a variety of fields of manufacturing and engineering technology. An engineering technician fills a gap in the engineering process by linking design and production control in manufacturing. This individual aids in the refinement of existing designs, the development of new ideas, the preparation of design layouts and working drawings, and the supervision of manufacturing processes.

***Technical assistance available:**

- Printed materials, when available, mailed upon request
- Tours of the institute's facilities
- Consultants on a fee or cost-recovery basis (including travel, lodging, and meals)

PROGRAM

Drafting Design Technology (Computer-aided Design Technology)

CONTACT

Clifford D. Layton
Computer Science Division Director
Rogers State College, College Hill
Claremore, OK 74017
(918) 341-7510, ext. 286

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The Rogers State College Computer-aided Design Technology Program comprises a 2-year computer-aided design degree program, computerized drafting for drafting and engineering students, computerized graphic arts for art students, and varied elective course possibilities for computer science students and others.

Microcomputer and minicomputer computer-aided design hardware and software and educational expertise are shared among the computer-aided design, computer science, drafting, engineering, art, and other programs on the Rogers State Campus.

***Technical assistance available:**

- Information concerning computer-aided design software, hardware, curriculum, feasibility, instructor recruitment, classrooms, and labs

Computer-aided Design and Drafting

PROGRAM

Drafting and Design Technology

CONTACT

Bill F. Brown
Coordinator
Technical-Occupational Education
Rose State College
6420 S.E. 15th
Midwest City, OK
(405) 733-7395

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1970

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The associate in engineering technology degree, offered as part of this program, is designed to prepare students, through an integrated theoretical and practical approach, to obtain employment in the industrial drafting and design technology fields. Program credits are transferable to universities where technology is offered. Students must complete courses with a minimum grade of C in each to receive the associate in engineering technology degree.

The industrial drafting and design technology certificate, which can be earned in this program, allows students to get a major portion of the program requirements in the associate degree in industrial drafting and design technology without taking the general education courses. Certificate recipients have the fundamental knowledge and skills required of industrial drafting and design personnel in a wide variety of industrial areas.

***Technical assistance available:**

- Information on computer-assisted drafting principles and practices at Rose State College

PROGRAM

Drafting and Printed Circuit Design

CONTACT

Lee Teitel
Director, CAD Program
Roxbury Community College
625 Huntington Avenue
Boston, MA 02115
(617) 734-1960

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

No

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

Students receive traditional (on the board) electromechanical drafting skills in the first year as well as an introduction to CAD. The second year reverses this, with most of the coursework on CAD and only an advanced manual Printed Circuit Design course required on the boards. Students also take courses in electronics, computer logic, programming, English, math, humanities, and social science.

Computer-aided Design and Drafting

PROGRAM

Computer-aided Design

CONTACT

Peter Fricano
Instructor
Triton College
2000 5th Avenue
River Grove, IL 60171
(312) 456-0300

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1980	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

Computer-aided design is a major option of the 2-year associate of applied science engineering design-drafting and technology degree and the 1-year certificate. In addition, a four-course advanced certificate is available to former graduates or individuals from industry who have on-the-job experience necessary for the computer-aided design courses. A wide range of hands-on experience is available through increasingly sophisticated equipment, including Techtronics, Bausch and Lomb (Winchester system), and Computervision. A renovated laboratory was installed in 1984.

***Technical assistance available:**

- Campus visits and sharing of ideas and information through correspondence and telephone calls

PROGRAM

Drafting and Design Technology

CONTACT

Sam Redding
Chairman
Science and Engineering Technologies Division
Tulsa Junior College—Northwest Campus
3727 E. Apache
Tulsa, OK 74115
(918) 834-5071

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1970

COMPETENCY BASED

No

PROGRAM DESCRIPTION

This program prepares the student for a career as a professional drafter. Employment opportunities for those completing the associate degree program include positions such as drafter, checker, layout technician, specification writer, design technician, and laboratory technician.

In addition to general education requirements, the following specialized courses and controlled electives are required:

Engineering 10 Hours

EGR 1063	Descriptive Geometry
EGR 1313	Manufacturing Processes
EGR 2314	Statics and Strength of Materials

Drafting & Design Technology 18 Hours

DRF 1323	Basic Drafting
DRF 1333	Intermediate Drafting
DRF 2313	Advanced Drafting
DRF 2333	Special Design
DRF 2363	Electronic Drafting (or)
ELE 1303	DC Electronics
DRF 2373	Computer Graphics

Continued

Controlled Electives 12 Hours

BUS 1313	Employee-Employer Relations
BUS 2363	Supervisory Management
CSC 1202	Computer Concepts AND
CSC 1221	Introduction to FORTRAN OR
CSC 1231	Introduction to Assembly Language
DRF 1353	Architectural Drafting
DRF 1363	Civil Drafting
DRF 2323	Production Illustration
DRF 2343	Process Piping Drafting
DRF 2353	Structural Drafting
MAT 1326	Machine Shop Technology I
MAT 2333	Basic Numerical Control Programming
MAT 2353	Basic APT Programming
SUR 1323	Surveying Problems I
WEL 2413	Welded Pressure Vessel Design

PROGRAM

Computer-aided Design

CONTACT

Doug Jorgensen
Department Chairperson
Utah Technical College at Provo-Orem
P.O. Box 1609
Provo, UT 84603
(801) 226-5000, ext. 165

ASSISTANCE AVAILABLE: Yes*

SYLLABUS AVAILABLE: Yes

START DATE: 1977

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

Drafting and design technicians prepare working drawings from layouts, sketches, or verbal instruction. They are highly skilled in lettering, both freehand and with lettering equipment, tracing work, engineering order changes, and special drawing changes and preparations. They design and lay out entire projects and validate the finished product in the fields of mechanical, electrical and electronic, structural, architectural, and civil drafting. In addition they are skilled in technical illustration and piping, welding, and plastics drafting. All of these require the utilization of computer-aided drafting systems. A Talon system is in use. Students participated in the development of the hardware and software for this system. The system uses high-resolution, high-speed, computer-aided drafting and design software for mechanical, architectural, structural, electrical, and civil drafting. In addition to classroom instruction, the program also provides experience with surveying techniques and has an active cooperative education program and placement program.

***Technical assistance available:**

- Consulting services

Computer-aided Manufacturing

PROGRAM

Computer-aided Design and Computer-aided Manufacturing

CONTACT

S.G. Steele
Dean of T.E.C. Division
Director CAD/CAM Center
Broome Community College
P.O. Box 1017
Binghamton, NY 13902
(607) 771-5014

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1982

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

At Broome Community College, computer-aided design and computer-aided manufacturing are integrated into electrical engineering technology, civil engineering technology, mechanical engineering technology, engineering science, and computer science. Required courses are as follows:

		Credits
CAD 200	Introduction to Computer Graphics	3
CAD 201	Advanced Computer Aided Graphics	3
CAD 220	Printed Circuits, Electrical Schematics, and Wiring Diagrams	3
CAD 230	CAD System Operations	3
CAM 210	Computer-aided Numerical Control I	3
CAD 299	Independent Study	

***Technical assistance available:**

- Consultants for colleges implementing courses
- Assistance with short-term training for new personnel
- Tours and demonstrations upon request

PROGRAM

Computer-aided Design and Computer-aided Manfacturing Technology

CONTACT

James G. Hudgings
Professor
Camden County College
P.O. Box 200
Blackwood, NJ 08012
(609) 227-7200, ext. 325

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This 2-year program leading to the associate of applied science degree trains technicians to be computer-aided design drafters or computer-aided design and computer-aided manufacturing systems operators. A core of computer-aided design and computer-aided manufacturing courses is complemented by a series of technical courses taken in the student's choice of three areas of specialization:

- Mechanical design
- Electronics design
- Systems operation and analysis

***Technical assistance available:**

- Additional information about the program

PROGRAM

Computer-aided Manufacturing

CONTACT

Albert Zachweija
Instructor
Triton College
2000 5th Avenue
River Grove, IL 60171
(312) 456-0300

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1972

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

Computer-aided manufacturing at Triton College is one of four options available through the Manufacturing Engineering Technician Program (robotics, industrial controls, quality control, computer-aided manufacturing). Students complete a common core of courses during the first semester designed to provide an appropriate background in technical math, physics, drafting, electronics, and machine-related areas and then move into their specialty during the second year. In addition to the associate of applied science degree program, a 1-year program and short-term advanced certificate are also available.

For those students wishing to have an extensive background in operation of machines, the Machine Tool Technology Program permits them to major in the second year in computer-aided manufacturing courses.

***Technical assistance available:**

- Sharing of ideas and information through correspondence and telephone calls

PROGRAM

Computer Maintenance

CONTACT

Northern Essex Community College
100 Elliott Street
Haverhill, MA 01830
(617) 374-0721

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1980

COMPETENCY BASED

No

PROGRAM DESCRIPTION

This career program trains students for positions as technicians skilled in digital computer software and hardware. Students concentrate on programming in assembly language and higher level languages and on analyzing and troubleshooting electronic circuits and systems. Laboratories emphasize hands-on experience with up-to-date computers and electronic instruments.

Computer Engineering Technology

PROGRAM

Computer Technology

CONTACT

Northern Essex Community College
100 Elliott Street
Haverhill, MA 01830
(617) 374-0721

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1964

COMPETENCY BASED

No

PROGRAM DESCRIPTION

The Computer Technology Program offers two options—business programming and computer science—that train students in the skills necessary for employment in data processing. Students receive extensive experience writing, keying in, and "debugging" programs on the college's computer systems. Graduates have entered varied areas of computer technology including systems analysis training programs, programming, and data processing management.

PROGRAM

Computer Maintenance Technology

CONTACT

Springfield Technical Community College
One Armory Square
Springfield, MA 01105
(413) 781-7822

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1979

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Computer Maintenance Technology Program is designed to provide the students with the necessary electronics background and the computer know-how to deal with the ever-changing computer technology of the space age.

SEMESTER 1

Number	Course Title	Class	Lab	Credits
LE 100	English Composition	3		3
EP 101	Intro. to Technology	2		1
ET 110	Basic Electronics	3		3
ET 115	Electronics Lab 1		4	2
ET 120	Electronic Graphics	1	2	2
MM 101	Mathematics	1		1
MM 102	Mathematics	1		1
MM 103	Mathematics	1		1
NP 109	Human Relations at Work	3		3
		15	6	17

Continued

SEMESTER 2

Number	Course Title	Class	Lab	Credits
LE 200	Comp 2: Intro. to Lit.	3		3
ET 210	Basic Electronics 2	3		3
ET 215	Electronics Lab 2		4	2
ET 220	Active Networks 1	3		3
ED 240	Intro. to Computer Organization & Prog.	2		2
MM 105	Mathematics	1		1
MM 106	Mathematics	1		1
MM 107	Mathematics	1		1
		14	4	16

SEMESTER 3

Number	Course Title	Class	Lab	Credits
LE 202	Technical Report Writing	3		3
ET 310	Active Networks 2	3		3
ET 340	Comp. Architecture and Logic Circuitry	3		3
ED 330	Machine & Assembly Language Programming	3		3
ED 350	Dig. Electric. Lab 1		4	2
EP 320	Data Communications	3		3
		15	4	17

SEMESTER 4

Number	Course Title	Class	Lab	Credits
ED 420	Microprocessor Theory	3		3
ED 450	Adv. Computer Topics	3		3
ED 410	Adv. Digital Elec. Lab		4	2
ET 430	Digital Comp. Systems	3		3
ET 440	Integrated Electronics	3		3
MP 119	Technical Physics	3	3	4
		15	7	18

PROGRAM

Microprocessor and Computer Technology

CONTACT

Dan Page
Electronics Instructor
Westark Community College
P.O. Box 3649
Fort Smith, AR 72913
(501) 785-4241

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1981	**COMPETENCY BASED**	No

PROGRAM DESCRIPTION

The primary electronics curriculum at Westark Community College is a 2-year associate of applied science degree program. It is unusually comprehensive in modern computer and programming courses, as well as the more traditional subjects such as radio and TV. Equal emphasis is placed on theory and laboratory work. The school has exceptional laboratory facilities. Students must demonstrate hands-on skills on various pieces of equipment to pass the courses in addition to passing traditional examinations on circuit and system theory. Graduates of this program are experienced in troubleshooting industrial control circuits, single board computers, digital and analog circuits, and radio and television.

Program graduates may elect to enroll in an optional third year of concentrated training in microprocessor and computer technology. This program provides additional training in computer systems, robotics, interface techniques for industrial control, and related programming.

***Technical assistance available:**

- Technical advice on course content and conduct
- Equipment, text, and software recommendations
- Orientation seminars

PROGRAM

Computer Engineering Technology

CONTACT

Joe Avampato
Department Head
York Technical College
U.S. 21 Bypass
Rock Hill, SC 29730
(803) 324-3130

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1981

COMPETENCY BASED

No

PROGRAM DESCRIPTION

This program takes advantage of existing programs in order to operate on a restricted budget. It includes courses from both electronics and computer technologies. It is designed to train students in computer programming and digital electronics. The outcome is an engineering technician who is employable in computer service, sales, training, and programming.

***Technical assistance available:**

- Additional information about the program

PROGRAM

Computerized Numerical Control Machining

CONTACT

Kim Morgan
Professor
Clark College
1800 E. McLoughlin Boulevard
Vancouver, WA 98663
(206) 699-0234

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1978

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

Clark College does not offer a major in computerized numerical control machining. However, supplementary classes are offered. The full 2-year daytime program offers an associate degree requiring the following courses:

MACH 251 Basic Numerical Control—This course teaches writing and testing programs for the computer numerical control mill and involves 3 hours of lecture per week.

MACH 252 Advanced Numerical Control—This course includes programming the Cinnimatic, Pratt-Whitney, Brown-Sharpe, Acroloc, and Burgmaster tape-controlled mills and drills and various address systems and knowing the safe and proper setup procedures. It involves 3 hours of lecture per week. MACH 251, with a grade of C or better, or the consent of the instructor is required to enroll in this course.

MACH 253 Advanced Numerical Control—This course involves programming the numerical control lathe; programming for various machine operations such as facing, turning, boring, and threading; and safe and proper setup procedures. It involves 3 hours of lecture per week. MACH 251, with a grade of C or better, or the consent of the instructor is required to enroll in this course.

MACH 254 Computer-assisted Programming—This course teaches how to use the Compact II time-sharing system to program the numerical control or computerized numerical control milling machine, knowledge of Compact II program language, and how to operate various terminals and the Hewlett-Packard plotter. It involves 5 hours of lecture per week.

Computer Numerical Control

PROGRAM

Computerized Numerical Control

CONTACT

Charles Granger
Department Head
Greenville Technical College
P.O. Box 5616, Station B
Greenville, SC 29606
(803) 242-3170, ext. 225

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This is a certificate program in advanced machining to teach students to operate computerized numerical control equipment. The course includes information related to feed and speed for different types of metals. Tape coding used in programming, consisting of RS-244A and RS-358, is taught. The study of machine controls, setting tools, and machine limits and capabilities is included.

In machine operations, the course covers the sequences of operation, alignment of the fixture, proper loading of the workpiece, how to verify the accuracy of tape, how to edit the program, machine control, setup of tools, and adjustment of the feed and speed at the machine.

***Technical assistance available:**

- Observation and training

PROGRAM

Computerized Numerical Control Continuation

CONTACT

Charles Granger
Department Head
Greenville Technical College
P.O. Box 5616, Station B
Greenville, SC 29606
(803) 242-3170, ext. 225

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This is a group of nine courses that comprise a continuation of the Computerized Numerical Control Program. This program includes training on creating, editing, and debugging computerized numerical control programs. Students produce tapes with the aid of the computer and practice programming for machine centers and turning centers. Topics covered include the following:

- Circular and linear interpolation
- Tape format
- Turret control
- Constant surface speed
- Proper operating of computer equipment
- Safety

***Technical assistance available:**

- Observation and training

PROGRAM

Computer Numerical Control

CONTACT

Dallas Garrett
Division Chairman
Engineering and Computer Technology
Lorain County Community College
1005 N. Abbe Road
Elyria, OH 44035
(216) 365-4191, ext. 435

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The computerized numerical control option was made available in 1983. The associate of applied science degree has been offered since the early 1960s. A move into a new high-tech center will make it possible to integrate computer-aided design, computerized numerical control, and robotics in the computer-integrated manufacturing laboratory. The program is designed to teach innovative concepts and provide students with opportunities for field experiences. The following equipment is used:

- Vertical mills
- Turning centers
- P & W Mill Drill
- Vax 11/750 Computer with 24 pheripherals, Apt IV, Compact II, N/C Graphics, Fortran, and Basic

***Technical assistance available:**

- Program philosophy statement
- Course outlines and descriptions
- Textual materials
- Equipment purchase assistance
- Equipment donation assistance
- Software purchase assistance
- Placement information
- Industrial contacts
- Use of laboratory assistants
- Job Training Partnership Act program writing assistance

PROGRAM

Numerical Control Machinist

CONTACT

R. W. Tinnell
Coordinator of Instruction
Oklahoma State University
School of Technical Training
4th and Mission Road
Okmulgee, OK 74447
(918) 756-6211, ext. 204

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	No
START DATE	1967	**COMPETENCY BASED**	No

PROGRAM DESCRIPTION

This 2-year (6 trimesters), 88 credit-hour program includes entry-level preparation on most conventional and numerically controlled machine tools. Machine-tool programming is done in the directly punched tape mode and computer-assisted mode using a variety of machine tool languages. The program prepares graduates for employment in a wide variety of machine tool positions, from machine operator to manufacturing technician, with an equally wide variety of organizations.

***Technical assistance available:**

- Suggestions on program organization
- Assistance with faculty training
- Recommendations on facilities development
- Information about equipment selection

PROGRAM

Numerical Control Service Technology

CONTACT

Bill J. Lyons
Department Head for Electrical-Electronics
Oklahoma State University
School of Technical Training
4th and Mission Road
Okmulgee, OK 74447
(918) 756-6211, ext. 252

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

No

START DATE

1982

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

An automated equipment technician is responsible for maintaining machine performance and will typically be involved in a coordinated effort with engineers, other technicians, and production operators. Career preparation in this field requires a solid background in electronics, mechanics, hydraulics, pneumatics, and thermal technology, as well as a knowledge of manufacturing materials, processes, and equipment.

The Numerical Control Service Technology Program is a multidiscipline effort involving classes in electrical-electronics, air-conditioning and refrigeration, diesel, drafting, and manufacturing departments.

Requiring 61 credit hours for completion, this program includes courses in electrical controls, basic programming and machining, fluid power, motors and controls, computer graphics, and numerical control computer systems.

Graduates of the Numerical Control Service Technology Program may elect to engage in additional course work in the area of industrial robotics. Upon satisfactory completion of this option, students earn an associate of technology in computer-integrated systems service degree.

PROGRAM

Electrical Technology

CONTACT

Springfield Technical Community College
One Armory Square
Springfield, MA 01105
(413) 781-7822

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1967

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Electrical Technology Program prepares students for work in the development, installation, and maintenance of industrial automated systems. Graduates of the program have also been successful as field representatives for manufacturers in the areas of product application and sales. Students planning to enter this field should have a desire for achievement and involvement in mathematics, science, and technology.

Minimum Grade Requirements: All EE and ET series Electrical Technology courses must be successfully completed with a grade of D or better for graduation. These Electrical Technology courses must be taken in a sequential order. That is, second semester courses cannot be taken until the first semester prerequisite courses are successfully completed as outlined in the Electrical Technology program. Before starting the third semester, the student must have successfully completed the Mathematics Modules MM 105-109. Upon the successful completion of requirements for this program, as listed below, the degree of Associate in Science in Electrical Technology will be awarded.

SEMESTER 1

Number	Course Title	Class	Lab	Credits
LE 100	English Composition 1	3		3
EE 110	Fund. of Electricity 311	3	3	4
EE 120	Engr. Graphics 311	3		3
NP 109	Human Relations at Work	3		3
MM 101	Mathematics*	1		1
MM 102	Mathematics*	1		1
MM 231	Engineering Computations	1		1
		15	3	16

Continued

SEMESTER 2

Number	Course Title	Class	Lab	Credits
LE 200	Comp. 2: Intro. to Lit.	3		3
LE 203	Fundamentals of Speech	3		3
EE 210	A.C. Fundamentals	3	3	4
EE 220	Fund. of Electronics 311	4		4
MM 105	Mathematics**	1		1
MM 106	Mathematics**	1		1
MM 107	Mathematics**	1		1
MM 109	Mathematics**	1		1
		17	3	18

SEMESTER 3

Number	Course Title	Class	Lab	Credits
EE 310	Elec. Cont. for Machines	2	3	3
EE 320	Ind. Electron. Circuits 1	2	3	3
EE 330	Semicond./Transistors 1	2	3	3
ET 340	Computer Conc. & Logic Cir.	3		3
MP 119	Technical Physics	3	3	4
		12	12	16

SEMESTER 4

Number	Course Title	Class	Lab	Credits
LE 202	Technical Report Writing	3		3
EE 410	Ind. Electron. Circuits 2	2	3	2
EE 430	Semicond./Transistors 2	2	2	3
EE 440	Electro-Mech Crt. Design	1	2	2
ED 420	Microprocessor Theory	3		3
EE 450	Oper. Amplifier Circuits	2	3	3
		13	10	16

**Math courses MM 104 through MM 109 must be completed and passed by the start of the third semester.

PROGRAM

Electronics Technology

CONTACT

Robert Dodson
Program Head for Electronics Technology
Boise State University
1910 University Drive
Boise, ID 83725
(208) 385-1538

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1984

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This program includes a basic first-year electronics course. Three second-year options are available: electronic technology, electronic service technology, and semiconductor electronics. An associate of applied science and a bachelor of applied science degrees are available.

PROGRAM

Electronics Technology (Digital Electronics Option)

CONTACT

Bunker Hill Community College
Rutherford Avenue
Charlestown, MA 02169
(617) 241-8600

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1979

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Digital Electronics Option includes courses in electricity, electronics, semiconductor devices, logic circuits, digital theory, electronics fabrication, microprocessor theory, practical circuit analysis, and computer repair as well as English, mathematics, and liberal arts electives.

This intensive program combines classroom work with electronics laboratory experience. Using state-of-the-art equipment, students are able to duplicate the same connections, tests, and measuresments that will be required by an employer. Skilled technicians will find that demand for their abilities is increasing in industry, telecommunications, and medical facilities where they are needed to assist in the design, testing, repair, and maintenance of electronic equipment.

To be eligible for admission to the Electronic Technology Program applicants must have completed through Algebra I and II with a grade of C or better.

First Semester

ENG 102	College English II	3
MAT 191*	Technical Mathematics	3
ETT 103*	Introduction to Electricity and Lab	4
ETG 111	Computer Systems for Electronics Technology	3
	Behavioral/Social Sciences Elective	3
		16

Continued

Second Semester

ENG 103*	College English III	3
ETT 153*	Semiconductor Devices and Lab	4
ETT 155*	Digital Theory and Lab	4
ETG 151*	Programming for Electronics	3
	Behavioral/Social Sciences Elective	3
		17

Third Semester

ETT 203*	Fundamentals of Electronics and Lab	4
ETT 205*	Logic Circuits	4
ETT 207*	Electronics Fabrication Techniques	2
	Liberal Arts Electives (2)	6
		16

Fourth Semester

ETT 253*	Practical Circuit Analysis	4
ETT 255*	Microprocessor Theory and Lab	4
ETT 257*	Computer Repair	4
	Liberal Arts Elective	3
		15

Total Credits 64

*Has prerequisite. See Course Description.

PROGRAM

Electronics Technology (Optical Electronics Option)

CONTACT

Bunker Hill Community College
Rutherford Avenue
Charlestown, MA 02169
(617) 241-8600

ASSISTANCE AVAILABLE	Yes	**SYLLABUS AVAILABLE**	Yes
START DATE	1984	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

The Optical Electronics Option includes courses in electricity, semiconductor devices, technical physics, electronics fabrication, optical theory, microwave theory, practical circuit analysis, fiber optics, and lasers as well as English, mathematics, and liberal arts electives.

This intensive program combines classroom work with electronics laboratory experience. Using state-of-the-art equipment, students are able to duplicate the same connections, tests, and measuresments that will be required by an employer. Skilled technicians will find that demand for their abilities is increasing in industry, telecommunications, and medical facilities where they are needed to assist in the design, testing, repair, and maintenance of electronic equipment.

To be eligible for admission to the Electronic Technology Program applicants must have completed through Algebra I and II with a grade of C or better.

First Semester

ENG 102	College English II	3
MAT 191*	Technical Mathematics	3
ETT 103*	Introduction to Electricity and Lab	4
ETG 111	Computer Systems for Electronics Technology	3
	Behavioral/Social Sciences Elective	3
		16

Continued

Second Semester

ENG 103*	College English III	3
ETT 153*	Semiconductor Devices and Lab	4
ETG 151*	Programming for Electronics	3
PHY 191*	Technical Physics and Lab	4
	Behavioral/Social Sciences Elective	3
		17

Third Semester

ETT 207*	Electronics Fabrication Techniques	2
ETO 209*	Optical Electronics and Lab	4
ETO 211*	Microwave Theory	3
	Liberal Arts Electives (2)	6
		15

Fourth Semester

ETT 253*	Practical Circuit Analysis	4
ETO 255*	Fiber Optics and Lab	4
ETO 257*	Lasers and Lab	4
	Liberal Arts Elective	3
		15

Total Credits	63

*Has prerequisite. See Course Description.

PROGRAM

Electronics Systems Technology

CONTACT

E. A. Dahlquist
Division Manager
Idaho State University
School of Vocational and Technical Education
Pocatello, ID 83209
(208) 236-3851

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1941	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

The Electronics Systems Technology Program is designed to produce professional, highly skilled electronics technicians. Training includes audio, video, RF, digital, and pulse electronic systems. This program is, by design, a balance of analog and digital training. The program can be completed in 3 years.

Classes comprise 5 hours per week of mathematics, including algebra, trigonometry, analytic geometry, calculus, and Boolean algebra—all applied to the appropriate and concurrent theory and lab courses; 5 hours per week of theory; 2-4 hours per week of a related course such as report writing, physics, economics, drawing, or human relations; and 15 hours per week of laboratory work with state-of-the-art equipment and circuitry. This results in nearly equal time devoted to hands-on and theoretical aspects of electronics circuitry.

***Technical assistance available:**

- Program outlines

PROGRAM

Electronics Technology

CONTACT

Alvin C. Eckre
Director of Administrative Services
North Dakota State School of Science
Wahpeton, ND 58075
(701) 671-2249

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1934

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The goals of the Electronics Technology Program are as follows:

- Provide students with entry-level skills in domestic, industrial, communications, and computer-oriented electronics
- Provide students with the technical competencies required to continue development in the field
- Develop students' abilities in human relations, communications, and other aspects of general education

Options available for the second year are as follows:

The Communication Systems Technology—This option is designed to qualify graduates for employment in the field of radio communications, including two-way radio, broadcast, and other electronic communication systems. Special emphasis is placed on solid-state equipment maintenance, including all types of radio communications gear.

Computer Systems Technology—This program is designed to provide graduates with the skills needed to obtain employment as technologists to operate computers and related automation equipment.

Electronic Servicing Technology—The goal of this program is to enable students to become skilled technicians with the ability to operate, install, and maintain all types of radio, television, and other electronic equipment.

Continued

Industrial Electronics Technology—This program is designed to qualify students for employment in the fields of industrial electronics and electronic maintenance, including the telephone industry. Technicians working with industrial electronics complete such tasks as preparing or interpreting layouts and other diagrams, developing and testing experimental electronic units, or performing maintenance and troubleshooting tasks. They assist scientists and engineers in designing electronic circuits. They also solve design problems, select suitable materials, and determine the best method of fabricating equipment.

***Technical assistance available:**

- Visits to the college electrical department upon request
- Sample lesson plans
- College catalogs

PROGRAM

Electronics Technology

CONTACT

Northern Essex Community College
100 Elliott Street
Haverhill, MA 01830
(617) 374-0721

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1964

COMPETENCY BASED: No

PROGRAM DESCRIPTION

The curriculum concentrates on developing complex, interdependent techniques for analyzing and designing electronic circuits. Heavy emphasis is put on the use of state-of-the-art devices and laboratory equipment, and the preparing of complete, analytical laboratory reports. There is a total of 68/69 credits required for graduation. The breakdown by major subject areas is as follows:

Circuit Analysis	8-12 Credits
Electronics	15-23 Credits
Mathematics	8 Credits (minimum)
Physics	8 Credits

First Semester		Credits
EN4401	English Composition I	3
MA5621	Algebra & Trigonometry	4
ET6611	Circuit Analysis I	4
CT6601	Fundamentals of Digital Logic	3
CT6603	Digital Electronics Lab	1
		15

Continued

Second Semester		**Credits**
EN4402	English Composition II	3
MA5662	Adv. Algebra & Trig.	4
ET6612	Circuit Analysis II	4
ET6627	Electronics I	5
	Liberal Arts Elective	3
		19

Third Semester		**Credits**
ET6673	Electronics II	5
PI5621	Applied Physics I	4
	Technical Elective*	4
	Technical Elective*	4
		17

Fourth Semester		**Credits**
ET6684	Electronic Systems	4
PI5622	Applied Physics II	4
	Liberal Arts Elective	3
	Technical Elective**	3/4
	Elective	3
		17/18

*Third Semester Technical Electives: ET6682 Digital Electronics, CT6651 Assembly Language Programming, ET6653 Circuit Analysis III, MA5651 Calculus for Technology, MA5691 Calculus I, CT6633 Intro to DP/BASIC

**Fourth Semester Technical Electives: ET6690 Microcomputers, MA5652 Advanced Calculus for Technology, MA5692 Calculus II, CT6634 Advanced BASIC with Applications, CT6622 FORTRAN Programming, CT6682 Computer Appications in Engineering and Technology.

PROGRAM

Electrical-Electronics Technology

CONTACT

Bill J. Lyons
Department Head for Electrical-Electronics
Oklahoma State University
School of Technical Training
4th and Mission Road
Okmulgee, OK 74447
(918) 756-6211, ext. 252

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

No

START DATE

1979 major revision

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The Electrical-Electronics Technology Program graduate is the key to the successful operation of such areas as computer technology, aerospace, communications, power generation, petrochemicals, and manufacturing. The graduate of a college-level program of study in electrical-electronics technology is skilled in research and development, field service, engineering support, and system design. The responsibilities and functions of these technicians are as diversified as the companies that employ them. The Electrical-Electronics Technology Program requires the completion of 90 credit hours. A minimum of 63 credit hours must be in technical classes and 27 credits must be earned in general education courses.

The technical curriculum consists of subjects in electrical fundamentals, electronic devices and circuits, electronic communication and controls, digital logic and design, microprocessors, and process control and instrumentation. Students receive 3,200 hours of theory classes and laboratory activities.

PROGRAM

Electronics Engineering

CONTACT

Dewey A. Yeager
Department Head for Electronics
Oklahoma State University—Technical Institute
900 N. Portland
Oklahoma City, OK 73107
(405) 947-4421, ext. 260

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

No

START DATE

1962

COMPETENCY BASED

No

PROGRAM DESCRIPTION

The Electronics Engineering Program is a 70-semester-hour program. It is mathematics and science based, and microcomputers and mathematics are emphasized through 2 courses (3 credit hours each) in technical calculus.

***Technical assistance available:**

- Curriculum development
- Course outlines
- Text books
- Laboratory equipment

PROGRAM

Electronics Technology

CONTACT

Wendall Johnson
Instructor-Coordinator of Electronics Technology
Pikes Peak Community College
5675 S. Academy Boulevard
Colorado Springs, CO 80906-5498
(303) 576-7711, ext. 207

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1972	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

This program prepares students to enter the labor market as electronics technicians. Most graduates work in electronic manufacturing where they are involved in testing and troubleshooting sophisticated electronic equipment. Some graduates become assistants to design engineers in the development of new electronics products.

Students entering this program must have skills equivalent to elementary algebra, basic writing, and basic reading for the technical industry.

***Technical assistance available:**

- Catalog and course outlines for the program
- List of suggested equipment

PROGRAM

Electronics Engineering Technology

CONTACT

Rodney A. Mendenhall
Program Advisor
Rochester Community College
Highway 14 East
Rochester, MN 55904-5197
(507) 285-7227

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1963

COMPETENCY BASED

No

PROGRAM DESCRIPTION

This electronics program is based upon the premise that the functions performed by electronic engineering technicians are closely related to research, development, and engineering activities. Accordingly, the electronics engineering technology curriculum is constructed so as to provide the educational background necessary for the many functions of technicians at the levels of design, development, production, and research. The program is structured so that it prepares graduates functionally to—

- enter into a job and be immediately productive with a minimum of on-the-job training,
- keep continually abreast of developments in technology, and
- advance into positions of increased responsiblity.

PROGRAM

Electronics Technology

CONTACT

Bill F. Brown
Coordinator
Technical-Occupational Education
Rose State College
6420 S.E. 15th
Midwest City, OK 73110
(405) 733-7395

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1970

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The Electronics Technology Program—resulting in an associate in engineering technology degree—is designed to prepare students, through an integrated theoretical and practical approach, to accept employment in the electronics technology field. Program credits are also transferable to universities where engineering technology is offered.

- Computer specialist—electronic computers
- Electronic communications specialist—telecommunications
- Industrial electronics specialist—industrial electronics
- Optoelectronics specialist—optoelectronics
- Quality-control specialist—electronics industry
- Robotics specialist—robotics
- Mechanical specialist—electromechanical technology
- Electrical power specialist—electromechanical technology

The Engineering Mechanics Technology Program—resulting in an associate in engineering technology—is designed to prepare the student, through an integrated theoretical and practical approach, to accept employment in the engineering mechanics field. Program credits are also transferable to universities where engineering technology is offered.

PROGRAM

Electronics Technology

CONTACT

Springfield Technical Community College
One Armory Square
Springfield, MA 01105
(413) 781-7822

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1968

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Electronics Technology Program is organized to present learning activities that will qualify the graduates to perform job functions in areas such as communications, control systems, computers, circuit design, and systems testing. Training for a wide variety of jobs is provided by a 2-year technical program of specialized, intensive instruction designed to fit individuals for useful employment as highly skilled technicians in the electronics field.

Minimum grade requirement: Students in Electronics Technology must receive a grade of D or better. A quarterly point average (QPA) of 2.0 must be achieved for graduation. Upon the successful completion of the requirements for this program, as listed below, the degree of associate in science in electronic technology will be awarded.

SEMESTER 1

Number	Course Title	Class	Lab	Credits
LE 100	English Composition 1	3		3
ET 115	Electronics Lab 1		4	2
ET 110	Basic Electronics 1	3		3
ET 120	Electronics Graphics	1	2	2
MM 101-103	Mathematics*	3		3
NP 109	Human Relations at Work	3		3
		13	6	16

Continued

SEMESTER 2

Number	Course Title	Class	Lab	Credits
LE 200	Comp. 2: Intro. to Lit.	3		3
ET 210	Basic Electronics 2	3		3
ET 215	Electronics Lab 2		4	2
ET 220	Active Networks 1	3		3
ED 240	Intr. to Comp. Organ. & Programming	2		2
MM 105-109	Mathematics**	4		4
		15	4	17

SEMESTER 3

Number	Course Title	Class	Lab	Credits
LE 202	Technical Report Writing	3		3
ET 310	Active Networks 2	3		3
ET 320	Comm. Systems 1	3		3
ET 330	Fund. of Pulse & Dig. Cir.	3		3
ET 340	Comp. Archt. & Logic Cir.	3		3
ET 350	Electronics Lab 3		4	2
		15	4	17

SEMESTER 4

Number	Course Title	Class	Lab	Credits
EE 410	Ind. Electron. Circuits 2	2	3	2
EE 430	Semicond./Transistors 2	2	2	3
EE 440	Electro-Mech Crt. Design	1	2	2
ED 420	Microprocessor Theory	3		3
EE 450	Oper. Amplifier Circuits	2	3	3
		10	10	13

**Math courses MM 104 through MM 109 must be completed and passed by the start of the third semester.

PROGRAM

Electronics Technology

CONTACT

Sam Redding
Chairman
Science and Engineering Technology Division
Tulsa Junior College—Northeast Campus
3727 E. Apache
Tulsa, OK 74115
(918) 834-5071

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1970

COMPETENCY BASED

No

PROGRAM DESCRIPTION

This program prepares the student with the necessary knowledge and skills to gain employment as an engineering technician, field service technician, or production technician in the field of electronics and to be able to advance to positions of increasing responsibility. Upon completion of the program, the graduate may apply for the examination to become a Certified Engineering Technician given by the Institute of Engineering Technicians.

Section A: General Education Requirements; Credit Hours: 22

English	6 hours	ENG 1113	Freshman Composition I
		*ENG 1213	Freshman Composition II or
		*ENG 2333	Technical Writing or
		*ENG 2342	Business Communications
Mathematics	6 hours	*MTH 1313	Technical Mathematics I
		*MTH 1323	Technical Mathematics II
Physics	4 hours	*PHY 1314	Applied Physics I
Social Sciences	6 hours	HIS 1483	American History 1492-1865 or
		HIS 1493	Amer. Hist. 1865 to Present
		POS 1113	American Federal Government

*Course has prerequisite.

Continued

Section B: Specialized Course Requirements; Credit Hours: 36

Electronics	*ELE 1303	DC Circuit Analysis
	*ELE 1313	AC Circuit Analysis
	*ELE 1333	Instruments and Measurements
	*ELE 2303	Systems Troubleshooting
	*ELE 2313	Digital Electronics
	*ELE 2333	Pulse Circuits
	*ELE 2343	Electronic Communications
	*ELE 2363	Electronic Amplifiers I
	*ELE 2373	Electronic Amplifiers II
	*ELE 2393	Digital Systems
	*ELE 2443	Microprocessors
	*ELE 2453	Advanced Microprocessors

Section C: Controlled Electives; Credit Hours: 6

BUS 1313	Employee-Employer Relations
CSC 1202	Computer Concepts and
CSC 1221	Intro. to FORTRAN or
CSC 1231	Intro. to Assembler Language
*DRF 1323	Basic Drafting
*EMR 1343	Electric Machines
*EMR 1353	Kinematics
*EMR 2303	Motor Control
*EMR 2323	Servo-Systems
*EMR 2393	Fluid Power

The 36 credit hours of specialized courses in section B contain those courses required for the Certificate of Achievement Program for electronics technology.

Electronics Technology

PROGRAM

Electronics Technology Technician

CONTACT

Ralph Merill
Department Chairperson
Utah Technical College at Provo-Orem
P.O. Box 1609
Provo, UT 84601
(801) 226-5000, ext. 364

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1950s

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Electronics Technology Technician Program is a 6-quarter program that leads to an associate of applied science degree or associate of science degree. If a student has not had basic AC and DC theory with accompanying mathematics, 2 additional quarters are required. The program provides students with the following:

- Basic knowledge of the atomic, chemical, and physical nature of energy in its various forms and its conversion in the production of direct and alternating current; voltage and electrical power; and the relationship of magnetic and electrostatic fields, resistance, reactance, impedance, electromechanical components, and radio frequency radiation in the conversion process
- The ability to work with resistors, capacitors, inductors, transformers, semiconductors, tubes, relays, switches, hardware, and other electromechanical components of electrical and electronic circuits and equipment
- The ability to fabricate, conforming to industrial standards, electronic and electromechanical equipment, printed circuit boards, and equipment containers, using basic hand tools, circuits, and ordinary shop equipment
- An understanding of the theory and use of rectifiers, filters, amplifiers, oscillators, modulators, detectors, wave-shaping circuits, stepping motors, syncros, control transformers, servos, magnetic amplifiers, and other circuits that, when properly combined, make up electronic and electromechanical equipment
- An understanding of the theory and use of receivers, transmitters, display devices, microprocessors, computers, and other equipment that, when properly combined, make up complete electronic and electromechanical systems

Continued

- The ability to use ammeters, volt meters, and ohmmeters; resistance, capacitance, inductance, impedance, and other measurement bridges; audio and radio frequency generators; transistor and tube testers; oscilloscopes and oscillographs; and other commonly available electronic and electromechanical test equipment and test systems
- The ability to coordinate efforts with other members of a testing, production, or research team
- Sufficient communication skills to receive and transmit instructions, processes, and ideas, and understand policies concerning work and its relationship to others
- An understanding of the economics, organizational structure, various levels of work, and related factors within the electronics industry, all of which contribute to development of an effective and cooperative employer

PROGRAM

Electronics Technology

CONTACT

Dr. Rita S. Meyer
Dean of Instruction
West Virginia Northern Community College
College Square
Wheeling, WV 26003
(314) 233-5900, ext. 213

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1972

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This program prepares graduates for jobs as industrial electronic technicians in manufacturing, production, and service industries. The curriculum covers the fundamental systems information needed for work in the computer, communications, aerospace, and industrial instrumentation fields. Emphasis is placed on digital solid-state logic, semiconductor circuit theory and analysis, and microprocessors. Students learn computer languages, applications, and design. The electronics practicum provides students with practical application, analysis, and troubleshooting experience on electronic systems. Classroom lecture is supplemented by laboratory work with up-to-date equipment.

***Technical assistance available:**

- Curriculum design assistance
- Technical information

PROGRAM

Electromechanical Engineering and Mechanical Engineering (Robotics Option)

CONTACT

Bristol Community College
777 Elsbree Street
Fall River, MA 02720
(617) 678-2811

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1968

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

Curriculum for these programs includes a 2-semester course in robotics and a 1-semester course in hydraulics and pneumatics. Students receive instruction in hydraulic and pneumatic applications on the state-of-the-art robotic equipment. They are trained in the theoretical, operational, and control concepts of robots, including programming, maintenance, installation, diagnostics, and supervision of robotic installations.

The carefully structured course sequences are built around applications, programming, process interface, and maintenance of robotics systems. Graduates will possess sufficient background experiences in the design, operation, and maintenance of industrial robots to compete successfully in this growing job market.

Electromechanical Technology

PROGRAM

Electromechanical Technician

CONTACT

Virgil Noordyk
Trade and Industry Coordinator
Fox Valley Technical Institute
P.O. Box 2277
1825 N. Bluemound Drive
Appleton, WI 54913-2277
(414) 735-5783

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1979

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The Electromechanical Technician Program is a 72-week course of study consisting of six 12-week blocks of time. The program operates on a year-round basis and allows new students to enter at the start of any of these blocks when openings are available.

The curriculum is designed to provide students with a basic electromechanical background. Laboratories are furnished with up-to-date instruments and instructional equipment necessary to gain the expertise and skills to use the tools and diagnostic equipment needed in technical jobs. Instructional emphasis is placed upon the understanding and troubleshooting of electromechanical systems. Upon successful completion of the program students receive the associate of applied science degree.

PROGRAM

Electromechanical Technology

CONTACT

Bennett E. Merry, Chairman
Industrial Technology Department
North Shore Community College
3 Essex Street
Beverly, MA 01915
(617) 927-4850

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1965

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This program offers training in electrical, electronic, and mechanical technology, providing students with the necessary skills to pursue career opportunities as electronic technicians, electrical technicians, production technicians, and draftspersons. The program includes in its curriculum microprocessors, microcomputers, telecommunications, robotics, computer-assisted design, and computerized numerical control.

Electromechanical Technology

PROGRAM

Automation Specialist

CONTACT

Dr. Bill F. Brown
Coordinator
Technical-Occupational Education
Rose State College
6420 SE 15th
Midwest City, OK 73110
(405) 733-7395

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1970	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

The Automation Specialist Program is designed to prepare students, through integrated theoretical and practical approach, for employment in the electromechanical technology field. Credit from the program is also transferable to universities where bachelor of science in technology programs are offered. Course options in electrical power and mechanics are also available. Students must make a grade of C or better in all program requirements in order to receive an associate in engineering degree in electromechanical technology.

***Technical assistance available:**

- Information about automation specialist, electrical power specialist, and mechanical specialist programs

PROGRAM

Electromechanical Technology

CONTACT

Rita S. Meyer
Dean of Instruction
West Virginia Northern Community College
College Square
Wheeling, WV 26003
(304) 233-5900, ext. 213

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1982

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This program prepares graduates for jobs in industrial instrumentation in the steel, mining, aluminum, electrical generation, and other related manufacturing industries. The curriculum covers the fundamental principles necessary for analysis and troubleshooting of electronic, hydraulic, and pneumatic systems. Emphasis is placed on digital solid-state logic, semiconductor circuit theory and analysis, and microprocessors. Students will examine and analyze hydraulic systems integrated with their ancillary controls in both electronics and pneumatics. Classroom lecture is supplemented by laboratory work with modern equipment.

***Technical assistance available:**

- Curriculum design assistance
- Technical information

PROGRAM

Engineering Graphics Technology

CONTACT

Melvin Smith
Director
CAD/CAM Center
Greenville Technical College
P.O. Box 5616, Station B
Greenville, SC 29606-5616
(803) 242-3170

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The new automated manufacturing engineering technology curriculum involves a 2-year program featuring computer-aided design and computer-aided manufacturing, robotics, programming, application, advanced machine II.

Greenville Technical College is a beta test site for manufacturing software by InFiSy Systems, Inc., which gives students the chance to use the latest in software.

The computer-aided design and computer-aided manufacturing program includes the following equipment and facilities:

- Computervision 200X Computer
- CADDS 4X Software
- Cincinnati Milacron T10 and Cinturn
- Bridgeport Series II Vertical Mill
- Tree Turning Center (Lathe)
- Numeridex Computer-assisted Programming Robotics Lab
- Minicomputer Lab
- Microcomputer Lab
- Instrumentation Lab

***Technical assistance available:**

- Seminars and workshops
- Resource center for identification of trends and innovations in high technology
- Guest lecturers

PROGRAM

Computer Graphics Program

CONTACT

Victor G. Langer
Manager of Computer-Based Instruction
Milwaukee Area Technical College
1015 North Sixth Street
Milwaukee, Wisconsin 53203
(414) 278-6247

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1980

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

Emphasis in the Milwaukee Area Technical College (MATC) Programs has been, first, to develop basic engineering skills and, second, to provide computer skills that can solve typical engineering and design problems. Learning how to use computer-aided design as a tool speeds up production. The challenge is to determine how to use computer-aided design as a tool and how computer graphics skills can be integrated into an existing curriculum. Objectives for each course must be analyzed.

In the Mechanical Design Technician Program, computer graphics objectives are integrated into six courses. In addition, two computer graphics courses are offered—an introductory course, that provides computer graphics operational skills and an advanced course designed to assist students in acquiring the skills necessary to apply computer-aided design to mechanical design problems, including three dimensional and descriptive geometry. The basic introductory computer-aided design course is also open to students in electrical technology, civil engineering technology, numerical control, commercial art, printing and publishing, and architectural technology programs.

An advanced course in electrical design includes printed circuit boards, electrical schematics, and other related applications. A new Electrical Design Technology Program now being developed will emphasize, first, the basics of mechanical design, electrical theory, and electrical drafting and then add computer graphic skills and electrical CAD. The Civil Engineering, Architectural Technology, and Commercial Art Departments are developing advanced application courses that are primarily offered as continuing education opportunities or as assignments for regular full-time students.

Continued

Continuing education courses offer an opportunity to test new areas with an industrial group, obtain direction for associate degree programs, and establish a relationship with a community of users. In a departure from engineering applications, computer graphics is being integrated into the telecasting program at MATC's channels 10 and 36. MATC's training opportunities in computer graphics are also being developed in production-related occupations where design databases become accessible for production purposes. The Welding Technology Department is developing instructions for obtaining the maximum number of parts cut out of a metal plate, automated flame cutting, and robotic welding. The Numerical Control Department developed a CAD to CAM interface going from design to actual cutting operations on numerically controlled machine tools. The Electrical Technology Department teaches industrial controls and other automation devices in a move toward computer-integrated manufacturing. The Electromechanical Technology Program is emerging as the basic program for preparing robotic service technicians. The Industrial Engineering Program brings together all CAD/CAM activities for efficient management of manufacturing and industrial processes.

MATC-CAD (TM) was developed at MATC to reduce the cost of design stations permitting use of the Computervision and Cadlinc systems for advanced courses. MATC-CAD is designed to be used primarily as an educational tool for teaching the basic elements of computer-aided drafting in the introductory course. The software is based on an emulation of most of the general two-dimensional capabilities of Computervision's CADDS-3 (TM) graphics system and uses the same student training manual. Hardware includes standard Apple II Plus or IIE microcomputer, graphics tablet, two floppy discs, and a green phosphor monitor with no modifications.

***Technical assistance available:**

- "How to Start Up CAD Training" (brochure)
- "Software and Materials for Interactive Computer Graphics course to Run on an Apple" (brochure)
- Software and materials for computerized machining to run on an Apple (available soon)

PROGRAM

Industrial Optics

CONTACT

Richard King
Instructor
Industrial Optics
Pikes Peak Community College
5675 S. Academy Boulevard
Colorado Springs, CO 80906-5498
(303) 576-7711, ext. 202

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1980

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This program prepares students to work in the industrial optics industry. Graduates of this program may work in such areas as optics production, testing, or evaluation of optical components and systems. Students may receive a certificate or an associate of applied science degree in this program.

***Technical assistance available:**

- List of equipment required for the program
- Catalog
- Condensed course outlines

PROGRAM

Laser and Electro-Optics Technology

CONTACT

Charles Chrestman
Assistant Director, Program Operations
Itawamba Junior College
653 Eason Boulevard
Tupelo, MS 38801
(601) 842-5621

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1984

COMPETENCY BASED

No

PROGRAM DESCRIPTION

The Laser and Electro-Optics Technology Program is a 2-year, associate of applied science degree program. The curriculum is interdisciplinary, with a collection of support, core, and specialty courses. Emphasis is placed on training technicians to operate, test, diagnose, and maintain lasers and other optical devices. Areas receiving the most emphasis are materials processing, communication, medical equipment, surveying, and construction.

PROGRAM

Mechanical Engineering Technology

CONTACT

Donald W. Lavine
Program Advisor
Rochester Community College
Administration Building
Rochester, MN 55901
(507) 285-7223

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1949

COMPETENCY BASED

No

PROGRAM DESCRIPTION

The Mechanical Engineering Technology Program began in 1949 as a 2-year associate degree program entitled Engineering Technology and remained so until about 1963. At that time, two new engineering technology programs were implemented: one in civil engineering and one in electronics engineering. As a result, the department changed the program title Engineering Technology to Drafting and Design Technology (with a mechanical and an architectural option). In 1971, this title was changed to Mechanical Engineering Technology. The civil and electronics programs were accredited by ECPD in 1971 and the mechanical program was accredited in 1972. All three programs were re-accredited in 1981.

In 1984, IBM donated two complete Fastdraft systems for computer-aided design and a cash grant to be used to implement a new associate degree program: manufacturing engineering technology with an emphasis on computer-aided drafting, automated systems, robotics, or computerized numerical control machining.

***Technical assistance available:**

- Consultants
- Course outlines
- Curriculum guides

Process Control and Instrumentation Technology

PROGRAM

Process Control and Instrumentation Technology

CONTACT

Melvin Smith
Director
CAD/CAM Center
Greenville Technical College
P.O. Box 5616, Station B
Greenville, SC 29606-5616
(803) 242-3170

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1984

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The program covers all the basics and advanced courses in electronic and pneumatic instrumentation and it can lead to a 2-year degree in process control and instrumentation. Upgrading and continued education courses are also available. Complete computer-interface-distributed control is taught.

***Technical assistance available:**

- Seminars and workshops
- Special short courses
- Resource center
- Guest lecturers

PROGRAM

Instrumentation Technology

CONTACT

Springfield Technical Community College
One Armory Square
Springfield, MA 01105
(413) 781-7822

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1981

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Instrumentation Technology Program is designed to prepare students for employment as highly skilled technicians in the broad field of instrumentation.

Instrumentation refers to instruments for sensing changes in heat or pressure, for recording information, or for controlling manufacturing processes that are vital in research, business, space technology, and many areas of industry. Because the instrumentation is so important, there is great demand for people trained to install, calibrate, and maintain the equipment.

Graduates of this 2-year program leading to an associate in science degree may be employed as instrumentation technicians, engineering associates, instrumentation research or process technicans, or instrumentation field service technicians.

SEMESTER 1

Number	Course Title	Class	Lab	Credits
EB 120	Measuring Principles 1	2	3	3
NP 109	Human Relations at Work	3		3
LE 100	English Composition	3		3
ET 110	Basic Electronics 1	3		3
MM 101-103	Mathematics	3		3
ET 115	Electronics Lab		4	2
		14	7	17

Continued

SEMESTER 2

Number	Course Title	Class	Lab	Credits
EB 230	Measuring Principles 2	2	3	3
LE 200	Comp.2: Intro. to Lit.	3		3
ET 210	Basic Electronics 2	3		3
MM 105-107	Mathematics	3		3
ET 215	Electronics Lab 2		4	2
ET 220	Active Networks 1	3		3
IT 120	Graphics for Instr. Tech.	1	2	2
		15	9	19

SEMESTER 3

Number	Course Title	Class	Lab	Credits
IT 310	Control Principles 1	3	3	4
EB 320	Calibration & Standardiz.	1	3	2
MP 119	Technical Physics	3	3	4
ET 340	Com. Architecture & Log. Cir.	3		3
IT 320	Hydraulics & Pneumatics	3		3
		13	9	16

SEMESTER 4

Number	Course Title	Class	Lab	Credits
IT 410	Instr./Repair & Trouble Shooting	2	2	3
EB 420	Instrument Project		6	2
NE 100	Economics 1 (or) Elective: Soc. Science	3		3
LE 202	Tech. Report Writing	3		3
ED 420	Microprocessor Theory	3		3
		11	8	14

PROGRAM

Automation and Robotics

CONTACT

Jerry Thompson
Chairman
Engineering Technology Division
Catawba Valley Technical College
Highway 64-70
Hickory, NC 28601
(704) 327-9124, ext. 242

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The automation and robotics curriculum is designed to prepare technicians to install, program, operate, maintain, service, and repair automated manufacturing systems, including robots. The course of study includes fundamentals of mechanical, electrical, and electronic technology with specific application of robots, controlling devices, and electromechanical equipment in automated manufacturing systems. The graduates of this curriculum will be prepared for employment in industries that utilize robots and other electromechanical devices in automated manufacturing.

PROGRAM

Electrical and Electronic Engineering Technology
(Robotics Option)

CONTACT

J. Leon Jones, Assistant Dean
Division of Engineering Technologies
Mathematics/Physics
Chattanooga State Technical Community College
4501 Amnicola Highway
Chattanooga, TN 37406
(615) 697-4445

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1980

COMPETENCY BASED

No

PROGRAM DESCRIPTION

The robotics option provides knowledge and skills needed to install, operate, and maintain automated control systems. In the first year the students acquire a strong foundation in electronics. Courses include DC circuits and instruments, AC circuits, electronic devices and electronic circuits, digital computer systems, and integrated circuits.

In the second year, students specialize in areas ranging from electromechanical systems to electronic control systems. The principles of pneumatics and hydraulics as they pertain to automated systems are taught. Training in state-of-the-art robotics applications is emphasized.

Students enrolled in the robotics option have access to the college's Center for Productivity and Innovation, where they receive hands-on training with industrial-size robots and automated control systems found in modern factories.

Students completing the robotics option may seek employment as robotics or instrumentation technicians.

PROGRAM

Robotics Technology

CONTACT

Charles Chrestman
Assistant Director, Program Operations
Itawamba Junior College
653 Eason Boulevard
Tupelo, MS 38801
(601) 842-5621

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

No

PROGRAM DESCRIPTION

The Robotics Technology Program is a 2-year associate of applied science degree program. It is an interdisciplinary program in which students receive training in robotics, fluid power, electronics, electricity, and programming.

Emphasis is placed on the integration of robotics into factory control systems. Local equipment controls, automated equipment controls, and material control systems used in the application and integration process are covered.

The technicians are trained to operate, test, and, in some cases, repair robots and other automated equipment.

PROGRAM

Robotics (Servicing)

CONTACT

Ray Walsh
Dean of Vocational and Technical Education
Jefferson College
Hillsboro, MO 63050
(314) 789-3951 or (314) 942-3000

ASSISTANCE AVAILABLE	Yes	**SYLLABUS AVAILABLE**	Yes
START DATE	1983	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

Graduates of the Industrial Robot Production Maintenance Program are expected to find employment as robotics technicians who work in manufacturing plants installing, troubleshooting, repairing, servicing, and maintaining robots and robotics systems. Technicians who are employed by robot manufacturers also assist in the design, manufacturing, and testing of robots.

Coursework includes resistive circuits, single time constant circuits, numerical trigonometry, exponents and radicals, fundamentals of semiconductors, technical physics, introduction to programmable controllers, hydraulics and pneumatics (I & II), semiconductor circuit analysis, introduction to digital circuits, introduction to electric motors, introduction to robotics, pulse circuits, introduction to microprocessors, sensors and transducers, servicing robot systems, humanities, technical English, social science, and physical education/health.

PROGRAM

Automation-Robotics Technology

CONTACT

Joel Lavalley
Instructor
Nashville State Technical Institute
P.O. Box 90285
120 White Bridge Road
Nashville, TN 37209
(615) 741-1235

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1984

COMPETENCY BASED

No

PROGRAM DESCRIPTION

The Automation-Robotics Technology Program provides the student with a broad range of technical skills in the electronic, electrical, and mechanical areas as they relate to the automatic control of manufacturing or other complex systems. State-of-the-art coverage is included on such topics as microprocessors, transducers, sensing devices, programmable controllers, and hydraulic and pneumatic systems. These individual topics are unified in courses dealing with the application of robots and troubleshooting. These courses provide the student with an understanding of the interaction of such equipment as it controls complex systems and with hands-on experience in correcting malfunctions in such systems.

There are a broad range of businesses and industries that utilize automated systems in their operations. Consequently, the number of jobs and their titles are varied and offer good opportunities for the graduates of this program.

Graduates of this program might take jobs as—

- maintenance technicians responsible for the repair and maintenance of automated manufacturing systems,
- robotics service technicians responsible for maintenance and repair of robots, or
- installation technicians responsible for the installation and start-up of automated systems.

PROGRAM

Robotics Technology

CONTACT

Dr. Corinne D. Grise
Northern Essex Community College
100 Elliott Street
Haverhill, MA 01830
(617) 374-0721

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1983

COMPETENCY BASED: No

PROGRAM DESCRIPTION

The Certificate Program in Robotics Technology is designed to provide practical experience in a long list of disciplines that have broad application to the modern industrial setting. The individual will learn, practice, and apply basic principles of industrial electronics, computers, automated equipment, sensors servos, steppers, relays, controllers, artificial intelligence, and more. The individual will gain practical hands-on experience with the basic elements of robotics, including programming, electronically controlled movement and positioning, interfacing, and data acquisition.

This is a 30-week certificate program providing a total of 29 academic credits in concentrated courses that develop skills essential for an individual to become a robotics-servicing technician.

First Semester		Credits
MA5687	Contemporary Math for Electronics	4
ET6111	Introduction to Electric Circuits*	4
CT6601	Fundamentals of Digital Logic	3
ET6603	Digital Lab*	1
EN4401	English Composition I	3
		15

Continued

Second Semester		Credits
CT6682	Computer Applications in Engineering Technology*	4
ET6690	Microcomputers*	4
ET6641	Robotics I*	3
ET6642	Robotics II*	3
		14

*Hands-on laboratory work as integral part of course.

PROGRAM

Digital Control Technician (Robotics)

CONTACT

Goesta Schmidt
Instructor
South Seattle Community College
6000 16th Avenue SW
Seattle, WA 98106
(206) 764-5394

ASSISTANCE AVAILABLE: Yes

SYLLABUS AVAILABLE: Yes

START DATE: 1982

COMPETENCY BASED: Yes

PROGRAM DESCRIPTION

The Digital Control Technology Program is a specialized 2-year training program leading to an associate of applied science degree in digital control technology. Students who successfully complete the program will be prepared for entry-level positions as builders, installers, and repair persons working with a variety of automated systems in which equipment and machines are controlled by microprocessors. Numerically controlled machines and industrial robots are but two of many examples of such equipment. Requirements for the associate of applied science degree are as follows:

Technical Specialty Courses

Number	Course Title	Credits
INT 160	Fundamentals of Electronics	8
INT 161	Amplifiers and Oscillators	8
INT 163	Communication Systems	8
INT 263	Digital Systems	9
INT 265	Microprocessors	10
INT 267	ServoControl Systems and Industrial Robots	10
INT 116-119	Programming for Electronic Technicians	4
		57

Continued

Allied Supporting Classes

Number	Course Title	Credits
MAT 111	Technical Math	4
MAT 112	Technical Math	4
MAT 113	Technical Math	4
PHY 101	General Physics	5
PHY 102	General Physics	5
PHY 103	General Physics	5
		27

General Education Courses

Number	Course Title	Credits
ENG 101	Composition	3
ENG 102	Composition	3
ENG 108	Technical Report Writing	3
	General Education Electives	9
	(one course must be in social science)	18

Total Credits 102

PROGRAM

Robotic Technology

CONTACT

Dean Eavey
Department Chairman
Robotic Technology
Vincennes University
1002 N. 2nd Street
Vincennes, IN 47591
(812) 885-4569

ASSISTANCE AVAILABLE

Yes*

SYLLABUS AVAILABLE

Yes

START DATE

1984

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This curriculum prepares graduates for employment as service technicians, engineering assistants, and manufacturing and industrial maintenance technicians. Students gain laboratory experiences in electronic fundamentals, communication techniques, digital systems, and microprocessors. An SAT math score of 450 is required in order to complete the program in 4 semesters.

***Technical assistance available:**

- Course syllabi
- Tours of facilities

PROGRAM

Integrated Circuit Fabrication Technology

CONTACT

Mike Reis
Division Director
Technical Occupations
Pikes Peak Community College
5675 S. Academy Boulevard
Colorado Springs, CO 80906-5498
(303) 576-7711, ext. 200

ASSISTANCE AVAILABLE

Yes

SYLLABUS AVAILABLE

Yes

START DATE

1982

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

The program is designed to prepare students for employment in the semiconductor integrated circuit manufacturing industry. Students in this program will have a strong background in chemistry and integrated circuit fabrication theory as well as hands-on laboratory experience to prepare them to become manufacturing process technicians in a highly technical and complex industry. Students entering this program must have skills equivalent to elementary algebra II, reading and study skills, and a review of writing skills.

Semiconductor Technology

PROGRAM

Semiconductor Technology Technician

CONTACT

Ralph Merrill
Department Chairperson and Director
Utah Technical College at Provo-Orem
P.O. Box 1609
Provo, UT 84601
(801) 226-5000, ext. 364

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

Yes

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

This program is still in a developmental stage. At present the program leads to a 2-year certificate or associate of applied science degree in semiconductor technology. The first year of the program combines the fundamental subjects of electronics, physics, chemistry, mathematics, BASIC language programming, and interpersonal skills. The second year provides specialized instruction to the students in semiconductor technology subjects such as production operations, process theory, electromechanical systems, team skills, and on-the-job training through cooperative education with industry. At present, the instructional aspects of the program are provided by Utah Technical College at Provo and Utah Technical College at Salt Lake with National Semi-Conductor providing the cooperative education aspect.

PROGRAM

Solar Technology Program

CONTACT

Paul L. McQuay
Dean of Applied Sciences
Delaware County Community College
Media, PA 19063
(215) 359-5288

ASSISTANCE AVAILABLE	Yes*	**SYLLABUS AVAILABLE**	Yes
START DATE	1979	**COMPETENCY BASED**	Yes

PROGRAM DESCRIPTION

The Solar Technology Program prepares graduates for employment in the solar energy and construction fields as entry-level technicians. The program includes solar hydronics, heat transfer, energy utilization, sizing, air systems, and installation skills. Experience in the Alternate Energy Laboratory is an integral part of this associate degree program.

***Technical assistance available:**

- Information about the program
- Consultants for proposal preparation, curriculum development, program review, and equipment selection

PROGRAM

Telecommunications

CONTACT

Ray Walsh
Dean Vocational-Technical Education
Jefferson College
P.O. Box 1000
Hillsboro, MO 63050
(314) 789-3951/942-3000

ASSISTANCE AVAILABLE

None

SYLLABUS AVAILABLE

No

START DATE

1983

COMPETENCY BASED

Yes

PROGRAM DESCRIPTION

Jefferson College will be one of the first educational institutions in the Nation to have a complete terminal facility. There are three major types of equipment composing this facility: an FDM Multiplexer, a microwave radio, and a 1000 port Danray Switch.

This program includes both electronic theory and actual hands-on experience in the college's modern telecommunications lab. The curriculum was developed in cooperation with MCI, a leading company in the telecommunications industry.

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